

SUPPLEMENT.

The Mining Journal, RAILWAY AND COMMERCIAL GAZETTE:

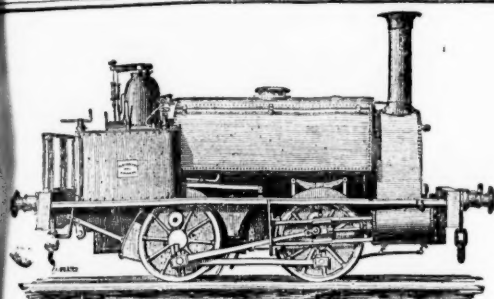
FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

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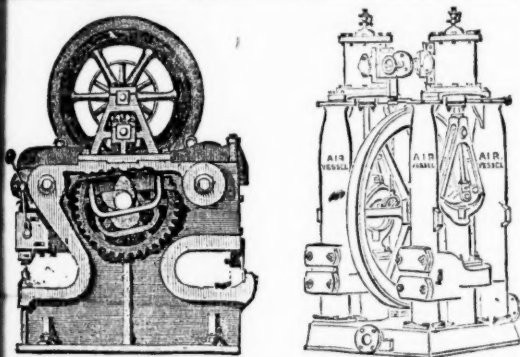
No. 2018.—VOL. XLIV.

LONDON, SATURDAY, APRIL 25, 1874.

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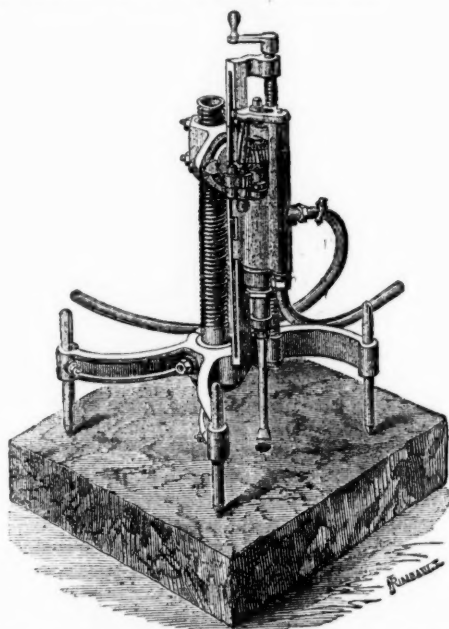


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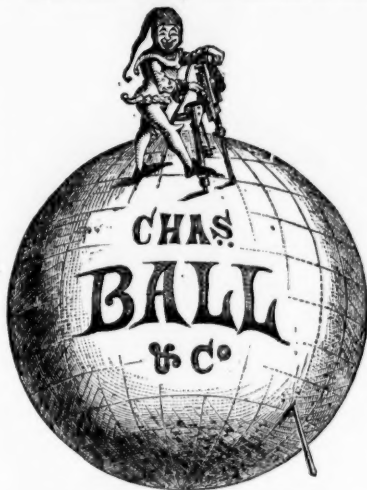
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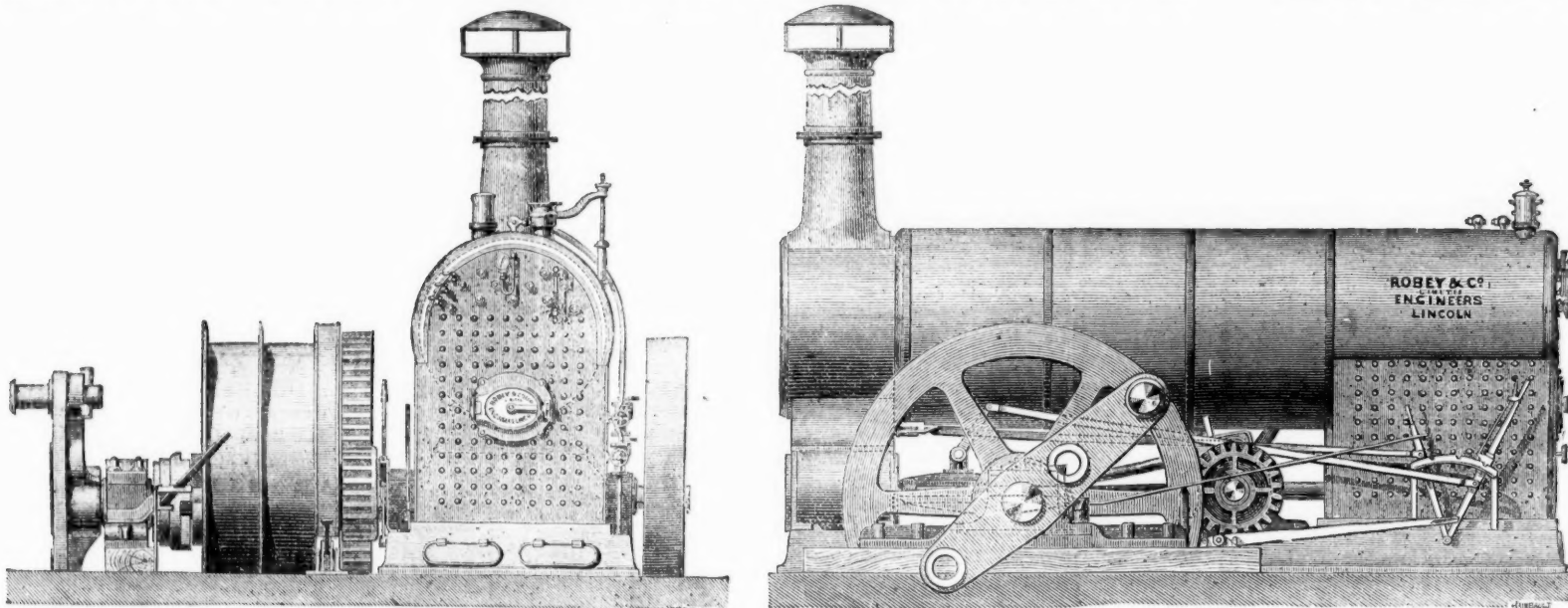
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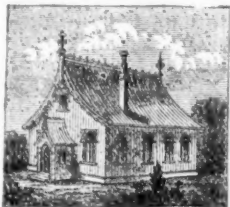
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DRAWINGS AND ESTIMATES ON APPLICATION



Original Correspondence.

MINING IN UTAH—THE EMMA.

Sir,—If Mr. Atwood reports the future of the Emma Mine as unpromising, he either intentionally misrepresents the true state of the mine, or is grossly ignorant of its formation and the faults which cross and throw the vein three times out of its course. I guarantee that either Mr. Clayton, M.E., of this city, or myself can find the (according to Mr. Atwood's representation) pinched out or lost vein, and make the Emma as valuable and good a mine as there is in Utah, except perhaps the Mono or Dry Canyon, which is the more valuable. I can demonstrate that, if at present the vein is lost it can be found, and will be lost a third time. If the shareholders of the Emma will study the chapter in mining on Faults (German, Sprung und Wechsel) they will find for themselves that there is nothing for a real practical miner to be afraid of, and that there are several sometimes puzzling, but in general simple, ways to find a lost vein. N. BREDEMAYER.

Utah, April 4.

MINING IN COLORADO—HALL VALLEY COMPANY.

Sir,—The remarks made in my last letter, in reference to the works and property of the Hall Valley Silver-Lead Mining and Smelting Company (Limited), in Park county, have brought forth a reply from Mr. Jebb, one of the directors of the company for America, in order to quiet the anxiety of some of his friends who were interested in the company, and also one from Mr. Inray, which last may be regarded as a mere supplement to that of Mr. Jebb.

In reply to Mr. Inray (who, I am informed, was working for some time in the construction of the tramway and mill which has been mentioned in this correspondence), who says that I have expressed an opinion upon a matter about which I am apparently altogether misinformed, I will simply quote Mr. Jebb:—"In *primis*, Mr. Roberts's description of the property is correct; the mines are high up, the winter is severe, and the ore was never claimed to be anything but low grade."

With reference to Mr. Jebb's communication, my remarks upon the company's procedure and property were true in every particular, and were not made with any intention other than the benefit and information of English capitalists who were now, or likely to become, interested in Colorado mines. I quoted the Park Pool Association as an instance of a successful company, who before expending a large amount of capital in reduction works had opened up their mines, discontinuing operations in those that proved of little value, and thoroughly developing those that were of assured richness. I may also notice the case of the Colorado Terrible Company, which is pretty nearly the only successful English company in the territory. If Mr. Teal, the able manager, had built mills and furnaces before he had thoroughly opened his mine the company would not have been in such a healthy condition, financially, as we now see it. Surface indications are utterly untrustworthy as to the exact kind of treatment required for ores which may be found as greater depth is gained, and seeing the course the Hall Valley Company were pursuing was exactly the same pursued by various companies in Colorado before. I expressed regret at what appeared to have been a suicidal policy. I am glad to learn of the company's success in discovering some good ore in the Leftwick lode, although in small quantity. At the time I wrote my last letter (October), just after I left Hall Valley, the developments mentioned by Mr. Jebb were, in most instances, just begun, and this is probably the reason Mr. Jebb omitted any mention of the assays of ore from the Whale lode. Opinions of mines given by professional metallurgists like Prof. Schirmer and Mr. Stewart, that certain lodes "look promising," more especially when, as they are here, unaccompanied by any attested assay, are of but little value in Colorado.

Mr. Jebb demurs to my description of the mines as being almost inaccessible during a great part of the year. As I am informed there has been no communication by teams between the mines and mill since the beginning of December until the present time, with every probability of the roads being closed until May. I cannot see the force of his objection, especially when we take into consideration that the present winter has been exceptionally mild. Only a few weeks ago information reached Georgetown that a miner working not far from the Whale Mine, in the next gulch, was buried in a snow slide, several of which are reported to have taken place in the company's property, one of them entirely demolishing certain buildings, and obliged the miners staying near to remove 1½ mile further down the valley for safety. I hope the company may succeed in getting 40 tons of ore per diem out of the mines, but to some who are acquainted with the property such a result is considered at least doubtful.

DANIEL ROBERTS.

Georgetown, Clear Creek County, Colorado, March 16.

ECLIPSE GOLD MINING AND QUARTZ CRUSHING COMPANY.

Sir,—Observing in the Journal of last Saturday a letter signed Capt. Thomas Faull, in which the writer, with malice prepense, has endeavored to cast aspersions on Capt. Eudey's character, and attribute to him sinister motives for the part he has taken in bringing the Eclipse Mine again before the public, I think it only fair that your readers should be informed that Capt. Eudey has made a statutory declaration (a copy of which is enclosed) that he has no interest in the purchase money to be paid for the property, nor in any bonus or commission thereon. Capt. Eudey has given the directors of this company every explanation with reference to the part he took in the sale of the property to the late company, and they are satisfied that discredit in no way reflects upon him.

Capt. Faull further seeks to convey to the minds of your readers that the Eclipse Mine is worthless; the answer to this will be found in the accompanying report, written by Capt. Faull in September, 1868, and published when the late company was formed. The public will best be able to judge of testimony such as Capt. Faull gives.

I trust that you will give this letter, and the report and declaration referred to herein, a space in your columns.

Coleman-street, London, April 21.

F. R. BLUETT, Sec.

JOSEPH EDEY, late of California, but now staying at the Charing Cross Hotel, London, for the purpose of negotiating the sale of the Eclipse Mine and property to a company, do hereby solemnly and sincerely declare that I have not either directly or indirectly any personal or pecuniary interest in the sum of \$20,000, being the price at which I am authorized to sell the said mine and property under and by virtue of a bond, dated Oct. 7, 1873, executed by Mr. Patrick Reddy, and that there exist no understanding or agreement between myself and the said Patrick Reddy, or any other person or persons whomsoever; that I, or any person on my behalf, am to have any bonus, commission, or advantage whatsoever on payment of the said sum of \$20,000, and completion of the said sale, and that as between myself and the said Mr. Reddy I am an entirely disinterested negotiator of the property, looking entirely for all remuneration and profit to the terms of my arrangement with the proposed company.

San Francisco, September, 1868.—In conformity with your request, I have inspected your property, situated on the western slope of the Inyo Mountains, in Tulare County, State of California, and am much pleased to lay before you my report thereon. The distance from Independence City to the above mine is about eight miles across a beautiful valley, irrigated by the waters from Owen's river. On arriving at the foot of the mountains before mentioned, and in order to approach the mine, I had to ascend through a deep ravine some 1100 ft.; here I found the commencement of operations on a splendid-looking lode, bearing north-east and south-west, with a dip of 45° east towards the mountain. The mine has been opened just as other mines are—sinking shafts and driving levels. I find here two shafts have been sunk on the lode, communicating with the 100 feet level and the 120 feet level; also a winze sunk 30 feet below the 100, thus showing the mine to be 130 feet deep. The lode throughout the mine averages from 7 to 10 feet wide, composed of a brownish quartz, gossan, iron pyrites, mica, &c., impregnated with gold and traces of silver-bearing rock. I took samples from every available place, both in the mine and from the large pile of rock lying outside, which results by assay were as follows:—\$80 per ton, \$96.50 per ton, and \$52.50 per ton. I am confident that if any man, interested or not, will go and take samples from the mine, and from inside the mine and from the pile on the outside he will find the result will be fully up to the produce of those taken by myself. The way the rock is taken from the mine is rather of a novel character: it is first dumped over a precipice 50 ft. high, then removed to another one 60 ft. high, and dumped over; it is then loaded in cars and sent down an incline 900 ft. long, substantially built, with a double-track laid, so that full cars going down will bring up empty ones. It is then hauled by teams to the mill, a distance of four miles; so the rock is pretty well broken up and mixed previous to going in said mill. I would suppose, according to the elevation of the mountain, that there is ground enough laid open in the mine to keep a 20-stamp mill running for four years, if not for a longer period. There are 500 tons of rock lying outside the mine, worth as per assay, in taking the lowest figures, \$80 per ton. Now, a good millman, who thoroughly understands his business, can put this rock through the mill with a very small loss, and handsome profits to the company. One 20-stamp mill in running 30 days would put through 600 tons of such rock. I presume the failure of the original company

was owing to imperfect machinery, not at all adapted for the work it was designed to do; hence I was not surprised to hear of the enormous loss of gold suffered by them, and the reason assigned for selling their property. For an outlay of \$20,000 or \$25,000 water can be brought to the mine from Owen's river in a sufficient quantity to drive any amount of machinery required, and the Eclipse Mine be made the best gold mine ever before offered to the public.—THOMAS FAULL.

COAL-CUTTING MACHINERY.

Sir,—In the Journal of a fortnight ago there was an article containing some comments on a paper I read before the Cleveland Engineers at their January meeting, and Mr. William Firth's (of Leeds) reply thereto at a subsequent meeting. I am unaware of the source from which the information was obtained, but I think it only fair to yourself to point out that it is altogether of an *ex parte* character. Mr. Firth, in the course of his paper, made some assumptions which may have led the writer involuntarily into error. I do not care to discuss at further length the relative merits of the Baird and Firth machines, for as both have now been brought prominently under the notice of the coal trade we may conclude that colliery managers and viewers have already formed their own opinions on this matter. But when I am spoken of as "Mr. Baird's representative" in reading my paper on coal-cutting by machinery, the writer does both the Gartscherrie firm and myself a great injustice. No one connected with the Gartscherrie firm knew anything about my intended paper on coal-cutting machinery (even although it made special reference to the Baird machine) until after it was read. I had for myself investigated its merits and performances, and, being satisfied that it really was the best machine of the kind, I selected it as the one best fitted to illustrate my remarks and calculations on the "probable influence of coal-cutting machinery on the future of the coal trade." As I pointed out at the March meeting of the Cleveland Engineers, I have no interest whatever—pecuniary or otherwise—in any coal-cutting machine, nor am I aware of being biased in favour of one machine more than another. If Mr. Firth could say the same it would enhance considerably the value of his strictures on my paper and his eulogy of his own machine. JAMES S. JEANS.

Pierremont Crescent, Darlington, April 18.

KALOSIC GAS AS A HEATING AGENT.

Sir,—I am much obliged by the criticism of your correspondent, Mr. H. C. Bartlett, F.C.S., on my Kalosic Gas, as it gives me an opportunity for further explanation, and enables me publicly to correct some vital errors and misconceptions into which he has fallen. I quite acquit Mr. Bartlett of any intention to misstate the case. I believe that he comes forward solely and entirely upon public grounds to discuss a public question in a fair way, without favour or malice, and either to expose its fallacy or to acknowledge its truth. I can wish for nothing better. I want the facts laid bare, and the matter probed to the very utmost, fully convinced that it is proof against any amount of battering. It would be a good thing for investors and for the general public, and would greatly advance the true interests of commercial enterprise and the development of legitimate science, if all novelties of this kind were passed through the same ordeal, and attacked right and left by competent critics. We should then have less of the mirage of joint-stock adventure, and more of sound investment and profitable reality. Now, to the business of this letter.

In the first place, I wish it to be understood that in the statements I have made as to the generation and combustion of kalosic gas, my quantities and measurements, though practically correct, are all given in round numbers; and, secondly, that in speaking of coal or coke by the pound or the ton, I do so in an engineering and commercial sense, which is quite near enough for my purpose. I am fully aware that both these substances contain a variable amount of water and ash; but this percentage drawback is not a speciality of my invention—I lay no exclusive claim to it. In all the various applications of these most necessary fuels, there is the water, and there also is the ash; and as their constant presence is known to all technologists, I thought it unwise to complicate the question still further by importing such considerations into a mere popular description, already sufficiently abstruse.

Referring to Mr. Bartlett's statements and deductions, I may say that there are few things so convincing as figures, but if any of the data should happen to be wrong upon which the calculation is founded what can the result be but wrong also? Whole generations of astronomers have at one time and another been profoundly busy in calculating the mean distance of the sun from the earth, and we know this, that all their calculations are confessedly wrong, because they have not even yet got the true parallax, and the coming transit of Venus will only bring them somewhat nearer to the truth. They will still be out to some trifling degree—perhaps a million of miles or so. Now, in the case before us, your correspondent, viewing the matter from a different stand-point to my own, and viewing it also possibly through a foggy atmosphere, which may be of my own creation, however inadvertently produced, may be said to have not got the true parallax of my Kalosic Gas. He, therefore, places the utility of the invention at an immense distance. I must try if I can bring it a little nearer.

Mr. C. Wye Williams is a high and acknowledged authority upon matters of heat and combustion, and he has tried innumerable experiments on these subjects on a large scale. He says that from a variety of circumstances it is found best in practice to allow 300 ft. of atmospheric air to every pound of coal consumed. I thought that a similar allowance should be made for every pound of coke. Let me call attention to the fact that when coke is wholly burnt and converted into carbonic acid it combines with two equivalents of oxygen, and the 300 cubic feet of air above named are sufficient to supply both these equivalents. But Mr. Bartlett makes the mistake of supposing that I require the 300 ft. of air to supply the second equivalent of oxygen only, which would imply that 600 feet are required altogether. If he will refer to the descriptive article on Kalosic Gas which appeared in the Journal of the 4th inst. he will see in the third paragraph all this distinctly stated as it is here expressed. Again, speaking always in round numbers, the bulk of the oxygen is one-fifth of the bulk of the atmospheric air which contains it, the remaining four-fifths being nitrogen. But when this oxygen is converted into carbonic oxide such proportion will no longer obtain. The four measures of nitrogen remain, but the oxygen in being converted into carbonic oxide doubles its volume, as is well known. Therefore, the proportion is no longer 1 of oxygen to 4 of nitrogen, but 2 of carbonic oxide to 4 of nitrogen, or, what is the same thing, 1 of carbonic oxide to 2 of nitrogen. Now as the specific gravities of carbonic oxide and nitrogen are almost as nearly equal as the balance can render them (see any tables) this measure of 1 to 2 converted into weight means also 1 lb. of carbonic oxide to 2 lbs. of nitrogen as constituting kalosic gas. Mr. Bartlett, however, converts the 2 lbs. into 2.8. How, I am at a loss to determine. He says the result is according to his figures. If so, his figures have run away with him. May I ask if such result is according to the teachings of the atomic theory? I say, without fear of contradiction, that the proportion of the gases present is, and must be, either 1 to 4 or 1 to 2, and experiment as well as theory proves it to be the latter. But 1 to 2.8. Why, Sir, there is not such a rope in the ship. The very supposition is in open rebellion against the whole fabric of volumetric chemistry. But I now proceed to some further startling results obtained from these same figures.

Mr. Bartlett gives an average quantitative analysis of what is called 13-candle gas, and, apportioning to each component its relative calorific power, he sums up, and arrives at the following result—that 1 lb. of such gas gives off in combustion a power equal to 12,718 units of heat. From the sum of these units we can easily get at the quantity of water capable of being evaporated thereby. If 1 lb. of the gas will give off this amount of heat 1 ton will give off 2240 times this quantity, or 28,468,320 units of heat. Now, it must be remembered that these are centigrade units, therefore we must ascertain the number of centigrade degrees expressing the total value of the sum of the latent and sensible heat of steam at all pressures. The corresponding number on Fahrenheit's scale is 1130°, and as 180° Fahr. are equal to 100° centigrades, so 1130° of the former are equal to 628° of the latter, which is the value required. As the relation between weights and units of heat are all propor-

tional it matters nothing whether we talk of pounds or tons. If, therefore, we divide 28,468,320 units of heat by 628 we obtain as a result the number 45, so that 1 lb. of 13-candle coal gas is capable of converting 45 lbs. of water at the freezing point into steam, or, which is obviously the same thing, 1 ton of this coal gas is capable of evaporating 45 tons of water under similar conditions. I am sorry to add that Mr. Bartlett only allows my gas a poor 3.5 per cent. of this wonderful heating power, which, being interpreted, means that 1 ton of my gas is only capable of evaporating 1½ ton of water. Now, it is universally admitted among engineers and chemists that the utmost theoretical limit of the evaporative value of 1 ton of average coal is 13 tons of water—a limit far beyond the results of present practice, and never even approached in actual working. The fact is that the coal has got no more than this amount of heat in it, and therefore no more can possibly be got out. The numbers, therefore, stand thus for 1 ton of each of the following materials:—Utmost possible limit for coal, 13 tons; 13-candle gas, 45 tons; kalosic gas, 1½ ton. This 1½ ton, then, is all I can manage to save out of the fire, according to Mr. Bartlett. He says that one or two of my statements are hardly fair. I think it is very unfair of him in this way to take his 13-candle gas into the stalls, and give my kalosic gas a seat upon the back benches. Can it be that he writes in the interest of some gas company? If so, it is of little use. No great and useful improvement can in these days be beaten back by opposition, however strong and however highly organized. Happily, my experiments, conducted on the largest scale, are in direct opposition to these specious and empty arguments, and sound theory puts its stamp on their contradiction. This very kalosic gas, which is now said to be so deficient in heating power, has melted with ease, and in the presence of numerous witnesses, a thick heavy 3-in. pipe of wrought-iron. I have never heard as much of 13-candle gas, nor even of the 50-ft. or the 100-ft. blast-furnaces wherein the crude iron was first smelted. Mr. Bartlett concludes his letter by a glance at the possible future, and says that "if in practice a very cheap heating gas can be produced" (the italics are mine) "the necessity for calculating results will no longer exist. Until then apparently miraculous statements will require scrutiny." Very true, and so will the chemical criticisms and calculations which profess to scrutinise them. ISHAM BAGGS.

1, Gresham-buildings, Basinghall-street, April 22.

CORUNDUM.

Sir,—Some little interest having been excited of late in regard to the Corundum (sapphire) mines of America, a few details from one who has had greater opportunities of examining them than perhaps any man living, and who is at the same time neither directly nor indirectly interested in any of them, may prove acceptable to your readers. My knowledge of the subject was gained from having been the owner of two of the principal mines, and from 18 months observation of the entire district, while making a mineralogical survey of the Southern Alleghenies.

The Corundum is found in irregular veins and pockets in the chrysotile serpentine. This rock crops out at intervals, often 20 miles apart on the course of at least three main veins or leads, running parallel with the Blue Ridge Mountains. Two of these recurring on opposite sides of the watershed were traced by myself for several hundred miles. Their geological characteristics are rather peculiar:—1. The outcrops are usually low, barren rocky hills or ridges (containing, as a rule, the finest pockets of corundum near the central portion).—2. These formations are rarely seen extending quite to the bottoms of the valleys, and are never found in the highest grounds.—3. They invariably occur in the mountain sides, and only where the line of outcrops crossed some principal water-course of the country.—4. The larger the stream the larger, as a rule, is the neighbouring outcrop.—5. Though of irregular outline, they are usually elongated in plan, the longest axis being invariably parallel, or nearly so, to the general direction of the neighbouring water-course.—6. Where two or more large streams unite near one of these formations the latter is invariably forked; a low ridge of serpentine running parallel to each valley, even where, as happens in two or three instances, the serpentine has to cross one of the water-courses to effect this. On these occasions, however, it is rarely found in the bed of the stream, being there replaced by the country rock.—7. Except under the above-mentioned circumstances, and the instance of the Horse-Cove Mine, and a parallel case in Georgia, to be mentioned hereafter, the serpentine is never found on opposite sides of the same valley. Now, what may we deduct from these facts? My theory is that at a period when the physical configuration of the country did not materially differ from its present appearance a series of fissures was formed in the earth's crust on the line of these outcrops. Eruptive matter overflowed at the lowest points—at the valley, crossing and filling the latter for some distance with viscid lava.

The outcrops soon consolidated, forming the enormous masses of cellular anthophyllites and stauite that invariably flank, and frequently entirely cover, the serpentine. The latter rock next formed, and counteracting as it cooled, fissure in all directions. In these cavities the "mother liquor," so to speak (still richer in alumina, and occasionally magnesia), crystallised out into various minerals, corundum among the rest. In the meantime the obstructed streams, finding the eruptive masses tougher and harder than the country rock (usually a micaceous schist), and fresh channels in the latter as at present existing.

Out of some 60 or more outcrops which I personally examined, only two formed apparently exceptions to these remarks. These cases being precisely parallel, I take one, the Horse-Cove Mine, on the head waters of the Chauga river, by way of illustration. Here the serpentine is in the bottom of the valley, and occasionally found on both sides of the stream. The great bulk of it seems, in fact, to have been already washed away, the country rock frequently coming to the surface in its midst. Yet, even here the theory is corroborated.

1.—These two are the only cases I met with where the directions of the streams and line of outcrops coincided. Hence the great length of the deposit, probably ejected from several different vents.

2.—The country rock in these instances is a hard, tough gneiss, more durable than the serpentine itself. The stream accordingly re-cut its old bed.

I propose in a future paper to particularly describe the mode of occurrence of the corundum in the serpentine.

WM. PHILLIPS THOMPSON,
Consulting Engineer.

6, Lord-street, Liverpool, April 22.

THE SCIENCE OF INVESTMENTS.

Sir,—The science of investments to be of any practical use, must be searching and earnest in its character and application, both as to merits in possession, with prospective probabilities of expansion, continuance, and partial or total collapse. In fact, no matter how prosperous an undertaking may have been, and great the profits which have rewarded the possessors, the investor must always bear in mind that the "past" is gone, the "present" alone is in existence, but the "future" only can reward him for his outlay. Hence these primary or cardinal points must guide him in the selection of mines for the employment of superfluous wealth. All mining pursuits are involved more or less in obscurity, and with the aid of the clearest intellect, the closest observation, assisted by practical skill, the sciences allied with the soundest judgment, we often find ourselves at fault, as may be instanced when, at the close of 1872 (15 months ago), Tincroft sold for 342,000£; Dolcoath, 287,000£; Van, 570,000£; Carn Brea, 150,000£; Tankerville, 180,000£; Roman Gravel, 228,000£; South Caradon, 92,000£; Kitty, 64,500£; Trumpet Consols, 60,000£; Cook's Kitchen, 66,000£; East Pool, 90,000£; Phoenix, 90,000£; and Terras, 75,000£. Thus we have a "baker's dozen" of mines selling for 2,294,500£, and within a period of a year and a quarter the aggregate value fell as follows:—Tincroft, from 57£ to 22£; Dolcoath, 67£ to 30£; Van, 38£ to 30£; Carn Brea, 150£ to 25£; Tankerville, 15£ to 8£; Roman Gravel, 19£ to 15£; South Caradon, 180£ to 40£; Kitty, 15£ to 6£; Trumpet Consols, 15£ to nil; Cook's Kitchen, 27£ to 4£; East Pool, 14£ to 6£; Phoenix, 15£ to nil; and Terras, 3£ to stoppage. Thus the student of the science of investments possessed within the scope of these mines

one an ample and extended arena for the exercise of intellect for vast gains and profits. It is true that several of these companies have advanced in value, yet there is wide scope for selection, with evident chances of early profits. The sensational decline in value consequent on importation of Australian tin has effected great and important changes in Cornwall. Seton, North Roskear, Great Vor, North Croft, Margaret, Providence, Wheal Owles, the Boscawell Downs, and other large and deep undertakings, have either succumbed or greatly restricted their operations, hence the "output" will be greatly diminished, and thus the supply and demand more equally poised. Again, the production of Australia will necessarily partake of a spasmodic character, and it is not improbable, from recent advices that the product for a time will materially fall off, while the application of the metal in manufacture and varied absorption will partake of a greatly extended consumption should ruling quotations continue. Why should not Germany and the Swiss Cantons adopt a tin carriage instead of that of nickel if it can be obtained at prices suitable to their purpose, and far more durable and economical in manufacture and use? This is a subject that engrosses at present considerable discussion, and may end highly satisfactory to the Cornish miner. Therefore, *nil desperandum* should be the watchword of all. It is within my recollection when Doleath, Cook's Kitchen, and North Roskear were the only important mines at work in the Carn Brea district, while it may be stated it required all the successes at Tresavean and the Gwennap Mines to dispel the gloom, which led to the resuscitation of the Croftys, Carn Brea, and Tincroft. The present bears no comparison with the depression so generally prevailing at the epoch to which I refer, while again the contraction of labour constitutes a favourable element in the future of Cornish mining.

There are incipient signs of improvement in many respects, and it is a source of congratulation that the number of young progressive undertakings upon which time and money have been expended far outstrip any other period within our recollection, while in Devonshire, especially in the neighbourhood of Dartmoor, rich and shallow veins have lately been discovered that cannot fail well to repay any capital that can practically be required in development.

At Bampfylde the cross-cut at the 70 fathoms level has reached the north lode, which yields rich grey copper ore of a high percentage. This is an important discovery, as it leaves backs of 40 fathoms high, wholly unwrought, under the deepest point of the old workings, and from which in ancient times vast quantities of ores were returned. This lode traverses the company's concession for fully two miles, and as no additional machinery will be required in drainage the value of the copper mines will become doubly enhanced. The iron and manganese mines belonging to the property yield equally well with former notices, and as the quantities at surface are computed to be worth 15,000*l.*, and the reserves are rapidly augmenting, this undertaking must be regarded as an accomplished fact. The second dividend, making 20 per cent. for the year, has been declared, while the future is fraught with promise. At St. Agnes Consols and Wheal Kitty the prospects are good, and many another mine could be enumerated which space precludes a further reference to on this occasion. — 32, Fleet-street, April 18. R. TREDINNICK, Dealer in Stocks and Shares.

CORNISH MINING.

SIR.—The staple enterprise of the county has undergone a favourable change, much to the satisfaction of all interested; the improvement, however, is not likely to stop here, for yesterday prices for tin were in excess of the official quotations. Already in one district alone (Camborne) the market value of the mines has gone up something like 150,000*l.*, which is proof that whatever disparaging accounts we may read of this industry the general public have every confidence in it when legitimately carried out. There are other districts that have not yet participated in the welcome rise, but must immediately follow, more particularly districts having shallow mines and little water to contend with. I strongly recommend all my friends to go into mines of this class in preference to any others, and to studiously avoid schemes having for their object the putting of a large amount of money into the pockets of so-called promoters; this species of mining has proved very detrimental to the interests of the county. People go into mines of this class at a high premium, and in a short time find the shares at about 50 per cent. discount; things go on from bad to worse, when by-and-by they find that the remnant of the capital called up has been all spent in developing the resources of the sett; the major portion of the capital gone, of course, into the pockets of promoters, then the cry is, I have lost my money in Cornish mining, which is not the case. The writer can name many a mine that has tided over the late calamitous depression which must shortly considerably rise in value, and that the present is a favourable opportunity for the investor, provided he makes a judicious selection, there cannot be two opinions.

Unfortunately, the public, in a great measure, run too much after schemes where the purchase money is put down at a high figure, the immense premium charged for the property being a sort of decoy duck, for if any reasonable amount were charged for a mine the public would not look at it, as they value the property according to the price charged—the celebrated Wheal Emma and other Californian mines to wit. Had but a small portion of the useless expenditure in such concerns been spent in proving the new ground of this county the result would have been less need for emigration, greater success to the shareholders, and better times for "One and All."—St. Day, Cornwall, April 22. CHARLES BAWDEN.

CARN BREA AND TINCROFT.

SIR.—Although several communications have appeared in your Journal and other papers devoted to mining matters referring to some remarks of mine on the financial position of Tincroft and Carn Brea at their last general meetings, I do not find that my figures have been refuted, or that my statement that both these mines were heavily in debt, notwithstanding the declaration of dividends, is proved to be untrue. I infer, therefore, that my figures are correct, and I think it is admitted by disinterested parties that there is but little doubt that a most discreditable system of issuing accounts has been shown up. Your correspondents, "A. R. O." and Mr. Tredinnick (I am in doubt whether the two letters are not from the same pen), are certainly down on me for my expression of opinion, and offer of advice to investors (which by-the-by I still adhere to), but, like others, they do not appear to attack my figures or to pretend to show that I am in error so far as they are concerned. "A. R. O." apparently seems only to jeer at my efforts to bring about a better state of affairs; however, it amuses him and does not hurt me—so there is not much harm done either way. "A. R. O." asks why are leading mines selected as the recipient of voluntary aid? The answer is, because they as leading mines should set such an example as may be well followed by others holding a less important position as mining investments.

I cannot myself see how any comparison can be drawn between the two mines referred to and South Frances, the former being in debt to the tune of thousands, and increasing that debt by the payment of dividends, and the latter charging up costs and bills, and making calls to liquidate those liabilities, and so establishing their position in the list of *bona fide* investments. Which is the most honest course to pursue I must leave for others to judge. If Carn Brea and Tincroft were to follow in the footsteps of South Frances I fancy the result would be that to meet the balance against the Carn Brea adventurers, as shown in my letter of Feb. 11, a call of at least 5*l.* per share would have been requisite, and to meet the balance against Tincroft Mine a call of nothing less than 25*l.* per share. These facts are almost too plain to admit of denial. I was somewhat surprised to hear, a short time since, that a gentleman holding the position of confidential agent or manager to one of the largest and most respected firms in the county was the deputed auditor to these two mines—Tincroft and Carn Brea.

As I am no doubt rightly informed, I cannot help making the remark that it is past my comprehension that anyone with a character at stake, and with a thorough knowledge of mining accounts in all its branches, should be so misguided as to permit such statements as were issued to the adventurers to pass as correct, as he must know very well their tendency to delude and deceive the

shareholders, and I should have thought his position would have placed him far above reproach. I am not aware that I have ever as yet questioned the ability of Capt. Teague as a miner or as a surface manager, but I cannot, and will not, admit that his mode of preparing accounts is in accordance with the usages and customs laid down by the Stannary Court for the guidance of miners, or that they are likely to improve his standing with those who have hitherto placed their confidence in him as the nominal trustee for the time of their property. Outside adventurers, satisfied, no doubt, with their quarterly dividends, and placing confidence in a name, are possibly mute to the real state of the affairs of the concern in which their money is invested, and it is only through the press that they can be enlightened, and made acquainted with the many dangers with which they may be surrounded. T. B. LAWS.

28, Cornhill, April 28.

LEAD MINING IN CARDIGANSHIRE.

SIR.—It is always a source of pleasure to be in a position to forward you anything cheering from this district, which for so many years has proved so productive and profitable, and which may yet be considered as only in its infancy. About 35 years ago I recollect the selling of what is termed the Potter's lead, which contained a certain quantity of silver, varying from 3 to 12 ozs. to the ton of lead, at from 8*l.* 10*s.* to 11*l.* per ton; and many, very many, thousands of tons of this metal were sold at or below the former price, the latter being considered as really very good indeed. At the time I mention the Goginan silver ore, and the mines in the silver district, containing from 30 to 40 ozs. of silver per ton of lead, was sold at from 13*l.* 15*s.* to 15*l.* 15*s.* per ton. At the former thousands of tons were sold, and the latter looked upon as rather an exorbitant price. What the profits of the lead smelters then engaged in buying these ores were it would be useless to go into, and we will content ourselves by the more pleasing reflection that this mode of treating the miners, or rather the shareholders, in these and other lead mines, led to better things, and that, although this state of carrying on the sale and purchase of the ores continued for a great number of years, it has ceased to be so for many years past.

We may here, however, just give a glance in passing at the cause of the extreme low price obtained at the time I have stated, and what opened the eyes of the blind to a better state of things. When the Potter's ore was fetching from 8*l.* 10*s.* to 11*l.* per ton, and the silver ore from 13*l.* 15*s.* to 15*l.* 15*s.*, it was always considered that up to a certain quantity of silver, ranging from 8 to 12, and even up to 15 ozs. in the ton of lead, would not pay for desilvering, believing, in reality, that these amounts of silver were lost to the smelters, or that, if obtained, the cost of extracting was greater than the profit; and the most important fact was forgotten and overlooked altogether—that by the smelters purchasing a certain quantity of silver ore, containing from 30 to 100 ozs., by mixing these ores together not only would all the silver be extracted, but the Potter's lead, being of a softer nature, would also act as a flux for the harder, or steel-grained, silver ore.

All this having been put right we have had no reason to complain of prices, the Potter's lead for some years past having realised from 14*l.* to 15*l.* per ton, whilst the silver ores, which were sold at from 13*l.* 15*s.* to 15*l.* 15*s.*, have been realising from 18*l.* to 21*l.* per ton. Neither have we at the present moment reason for complaint, but for congratulation, seeing that prices for lead ore (Potter's) are bringing from 13*l.* to 14*l.* per ton, and the silver ore alluded to from 18*l.* to 20*l.*, whilst the price of tin ore has dropped from 80*l.* to below 50*l.*, and the standard for copper from 140*l.* to 95*l.*

During the past 30 years the parties mining in this district have had to lay out large sums of money for making water-courses to the different mines, extending almost from the very top of Plynlimmon to the sea, for working the properties by water machinery, and for making large reservoirs, so as to ensure a continual supply of water all the year round. As the last instance of this, I may name the Powell Consolidated Mines, where, up to the last few months, the pumping, drawing, and crushing were done by means of a steam-engine, and the carriage from Aberystwith, between 11 and 12 miles, and freight from South Wales, with extra charges, of themselves were sufficient to drown the profits of a moderately small concern. The management of these mines having gone into other hands, arrangements were made for bringing in an abundant supply of water for working them, and this was soon accomplished, and there is now a powerful and good water-wheel 40 ft. in diameter and 4 ft. breast pumping, crushing, and drawing, instead of that most expensive machine—the steam-engine. I might add many reasons for the employment of water-power where it can be obtained, in not only the saving of a great expense, but that of husbanding our supply of coals for future generations, as well as by obtaining a greater quantity than is really required, causing extravagant wages to be demanded by the colliers, and thus causing the most unpleasant business which is now existing between masters and men. Let us hope soon that by economising fuel, and by carefully attending to the resources which may be obtained by any other means, a better state of things will soon take place.

I intend in my next letter to point out the very important results that must accrue, not only to the Powell Consolidated Mines by the bringing in of the water stated, but to every other mine in that district now at work, and waiting to be worked, the latter of which I shall give some particulars of, for, I hope, the benefit of some spirited company who may feel inclined to invest capital in the county. In concluding this letter, I would say it is with great pleasure, after having been underground at Powell Consolidated on Friday last, that they are opening out in whole ground in the 72, on the richest course of lead ore now working in the county. Goginan, Aberystwith, April 21. ABSALOM FRANCIS.

MINING IN MONTGOMERYSHIRE.

SIR.—Permit me to lay before your readers a few facts relating to mining in this district. It is needless to say anything about the great levitation of the district—i.e. the Van. The quantity of lead and blende vomitted forth from the bowels of this mine is very great at present, but likely to be enormous eventually, while Van Consols is gradually and steadily opening up rich ore-paying ground. Indeed, this is likely to be one of the best mines in Wales for productiveness, while they have spared no expense in erecting the most modern and complete ore-dressing machinery, but why the shares should be quoted as low as 4*l.* is quite a mystery, but I suppose it is not always the richness or poorness of a mine that governs the prices of the shares, but other oracles quite apart from the intrinsic value of the mine. Hence, the shares in some fine things in this district may be often found selling at a premium, whereas the whole mine at the same time is not worth a single cent.

Some fine discoveries have recently been made in the old Dyffylle, which is likely to prove a rich mine again, especially if the drivages are continued of the different ends, but not without, not by packing the men all of a heap just in the one place. The produce of the Dyffylle lead ore has been undoubtedly considerably greater than all the other lead mines of Montgomeryshire put together so far, having been worked for many ages past; therefore, it can easily be supposed that the Dyffylle Mine has been worked to a considerable depth, and the ground for the most part has been all taken away from that depth up to surface by former workers. It is the opinion of practical miners in this neighbourhood that if the levels were continued, the drivages persevered with, new bunches or deposits of ore would be discovered, and in ground which would be whole right up to surface. Immediately to the west, and adjoining the Dyffylle and on the same lode, we have the old Dyffylle, once a very rich mine, and I was informed when in the neighbourhood that it was about to be re-worked, it was thought, with vigour once again. In fact, the Dyffylle district is quite a mineralised country, and for a circumference of at least six miles round the Dyffylle are to be seen some of the finest outcrops of lodes at surface that could by any possibility be discovered in any portion of the United Kingdom; indeed, I seldom or ever saw such strong gossanous backs of lodes cropping out at surface as some of these are, especially at the Cefn Hafod and South Dyffylle Mine, a new mine now being opened, and about 1½ mile south from the old Dyffylle. Here I found they were driving four adit levels, three going west into a very high hill from the side of the river; I went into two of them, and those two different lodes I never saw prettier, or as I should think more congenial for making lead ore. I thought the continuous branch of carbonate of lime along the footwall side in the adit level driving on one of those lodes was the finest and kindest matrix I had ever seen for lead. There can be in the mind of any competent miner no manner of doubt that those lodes upon which they are driving now at Cefn Hafod are large deposits of lead ore; the lodes are large, strong, and well defined, in precisely the same kind of rock and stratification as the Van and Dyffylle lodes; and it is to a wise selection of these young and new mines, such, for instance, as the one just referred to, that home adventurers must look forward to (although I understood the above mine is the property of a private party) in this country, for many of the old ones, though they have been strong and vigorous, many of them in their day having produced much wealth, are now, to many of them unfortunately, getting into the sere and yellow leaf. There are some other young things in this country, or rather district that are promising well, while there are some young things, if I may so term them, that are not worth the paper it would take to write their names upon.

About two miles south of Cefn Hafod and South Dyffylle Mine, on the side of the Severn river, is the Nant-y-Ricket Copper and Lead Mine, a mine that was the sole discovery, and opened to begin with, by the same person as is now opening up Cefn Hafod, Capt. Price. At Nant-y-Ricket they have a very fine lode of a high percentage copper at present in the adit level on the No. 1 lode; indeed, they appear to have gone through a long run of copper in this level, scarcely any of which has been stopped away, and not gone through it, for, in fact, it is still in the end quite as strong as ever. There can be no doubt but when this level on the No. 1 lode is driven into the strength of the hill, the probability is that the deposits of lead ore will be met with; and from a conversation I had with the discoverer of the lodes, Capt. Price, some two years ago, such is his opinion; and that, moreover, at certain depths below the base of the hill the copper will die out, and lead replace it. Indeed, in the level driven on the No. 2 lode the copper has died out completely some time, and fine silver lead is now beginning in this level to show itself, as they are proceeding more into the strength of the hill. But before this mine is fairly opened up both these adit levels, one on each of these two great masterly lodes, must be driven considerably further into the hill before great results can be expected, and an engine shaft sunk between both the lodes, as they run parallel, so as to be able to intersect both lodes by cross-cuts in depth, say, at the 20, 30, 40, 50, and 60 fms. levels. This done, and Nant-y-Ricket would vie with any mine in the kingdom. It is one of the finest mineral properties in Wales, and the manner in which Capt. Grenfell is working it, with the resources at his command, does him much credit.

About two miles east of Nant-y-Ricket is Gwestyn Consols; here they have the Great Van lode, and are now driving an adit to intersect it; and under the management of a man so long and intimately acquainted with that property as Capt. Pearce, it will not be surprising if something very good should be heard of Gwestyn Consols some day. —Llandudno, April 22. VERITAS.

REMARKS ON THE "ORIGINAL CORRESPONDENCE" IN THE SUPPLEMENT TO LAST WEEK'S "MINING JOURNAL."

SIR.—"The Richmond Mining Company;" Mr. J. D. Powers' letter seems to be a personal attack on Mr. Emersley, who gives us a temperate and judicious letter, apparently showing very accurately the position of the Richmond, and the erroneous calculations of mining experts and professors, whether they have studied under Dana, or jumped into their profession without such scientific preparation. Calm, reasonable, and correct statements do not, however, fit the mining men of Nevada, hence Mr. Emersley must be written down unless he learns to estimate values at about five times greater than they are to suit that particular school.

"Mining on the Pacific Coast;" That the mines are as productive as Mr. James F. Clough has shown we do not dispute, but would be glad to see a few more of the benefits transferred to this side, whence so much capital has been drawn to work them.

"The Gold Industry of Nova Scotia;" "Acanthisis" has given us a long letter to prove that this is of little or no value. This much vaunted gold field has yielded in 13 years 911,000*l.*, over an extent of territory of 300 miles in length, embracing 13 districts. To this result five mines have contributed 300,000*l.*, leaving 611,000*l.* for all the other mines in the province. Sherbrooke has been given as the district most systematically developed, and here 21 companies have produced an aggregate of 225,000*l.*, more than all of which has been swallowed up in the cost of production. It would be an interesting enquiry how much capital has been expended in the production of this 911,000*l.*, and how many millions sterling more would be required to raise another 900,000*l.* worth of gold. The lodes are said to be 1*l.* and under in width; we believe that a large number are under. Contrast this with the Pacific Coast, where, according to Mr. Clough, we have two mines, each of which has paid in dividends in one year a larger amount than the whole of the Nova Scotian yield has been for 13 years.

We pass over some letters which are not of general interest, and notice "Kalsie Gas," which appears to us to offer an escape from some of the miseries inflicted by the recent combinations of colliers, and hail it as a step in advance.

Mr. N. Ennor writes a series of letters, abusing everybody as usual, and among others we have come in for a share of this gentleman's kind remarks. This does not altogether satisfy him, as he threatens us with a dire vengeance when he comes down closer on us. Mr. Ennor has already, on more than one occasion, been too close with us for his own equanimity, and, probably, he may meet again with similar disappointment. Our object is not to attack anyone, but we cannot avoid making remarks when people will write nonsense, which seems to be one of Mr. Ennor's qualifications. Let Mr. Ennor write judiciously, as he can, and sometimes does, and we should not have so often to visit him with reproof.

"Australian Tin Mines;" "Caution" has hit the mark respecting these forthcoming Tasmanian prospects. If tin exists there in such quantities as represented the people in the colony are quite equal to working it themselves, while, if not, it shall be favoured with the privilege of subscription capital to pay heavy premiums on extensive grants. READERS OF THE "MINING JOURNAL."

MINERS' PAY—THE THIRTEEN-MONTHS SYSTEM.

SIR.—Having only just seen the Journal of April 4, I again reply to "Unity," who has written a first-class letter as regards language, and one cannot help admiring his ease of composition, and the spontaneous outburst with which he gives vent to his thoughts, but the mission of the letter is not, like Armstrong's guns, to protect, but, like the "Prussian needles," to oppress. "Unity," in his letter, says "These reasons, upon just examination, are irrefutable," having to labour many fathoms under the surface, aided by the light of a "flickering candle," it is not to be wondered at if our natural sight should be impaired, and as there is a connecting link between the mind and the body the intellectual must also suffer. Will "Unity" kindly give a list of these "irrefutable" arguments, as the writer candidly admits that his calibre and mental faculties have only seen but one, as previously stated. Do not think the following egotistical. Although a miner, yet feel confident I could prepare the accounts for a mine meeting, without "bamboozling" or leading the adventurers through long winding labyrinths of inextricable mazes, as too frequently happen at our accounts. Does not "Unity" know that if there is a debit side thirteen times a year there is also a credit side? Not being in the prophetic line, I shall not express an opinion relative to whether the four-weeks system "will injure" or "be fatal to the thought" in your case undoubtedly.

Again, "Nothing short of rendering accounts upon the calendar monthly basis can give proper satisfaction;" not knowing much about the commercial world, with the exception that very many accounts are rendered "satisfactory," and the balance struck, "pro or con," only once in six months.

"Unity" says that "The adventurers must be consulted." The miners throughout Cornwall would hail with delight and enthusiasm the advent of a distant shareholder, and would acquiesce with anything which he would propound only, I believe (although I trust not) the day is distant, as, whilst standing on the mountain of expectation, we see no rays of association from the Oriental sun of mining empiricism to dispel the fog and lead some clouds of unpleasantness and discontent, and to scatter broadcast the ambrosial, refreshing, and cheering beams of sociality and intercourse which would inevitably be conducive to prosperity and success in Cornish mining.—Camborne, April 22. TROON INSTITUTE.

TO THE READERS OF THE "MINING JOURNAL."

I am no packman, nor connected with them, either directly or indirectly, and shall not attempt to reply to such extraneous matter from the real point. To use the words of an ancient, "If an ass kicks me must I return it." I am a miner, and am sorry that not an able pen has been wielded to elucidate our grievances and regret of the ability when I have attempted to give a verdict concerning the question at issue. In replying to "Readers" last year on this point, I told them it was easy to make an assertion but difficult to substantiate it. I suppose that "Readers," like one of England's annalists, who searched for facts after the publication of the history, are searching for facts to corroborate their statement that my letter "would be the means of doing immense mischief." How is it possible for one of that class, whose views are not entertained, whose opinions are erroneously treated as contemptible, and who even are not allowed to give judgment in a case of vital importance to themselves.

Again, "A month's wages out of nothing." Place "Readers" in a mercantile or other office, they have to go through a certain number of books in a given time, and be paid a certain amount for each revolution. Experience teaches them that they can perform the work thirteen times a year, and by receiving thirteen pence they actually take wages from the principal for work never accomplished. I have lately heard of the new syllogistic logic, but the above must be an illustration.

In my next I may give a few suggestions concerning mining.

SOUTH WENDRON TIN MINE.

SIR.—I understand that some of these shares will be placed on the market next week, and as there are 70 fms. of tin ground now laid open, ready to be returned at a profit of 35*l.* per fathom, or 2450*l.*, and the value of this mine having, with others, considerably advanced within the past ten days, the small proportion of shares to be offered will be rapidly swallowed up, and those wishing to secure any should give their brokers early intimation.

RE SHELTON CLAY AND TIN MINING COMPANY.

SIR.—With reference to a letter, signed by Mr. William Garty, of Dublin, which you published in last week's Journal, I beg to say that Mr. Garty is not correct in stating that no accounts of the liquidation has been laid before the shareholders and meetings held since the company went into liquidation. The real facts are, that every shareholder has from the time since I was appointed, in January, 1873, been informed of the proceedings. No less than three general meetings have been held, at which full accounts and reports of proceedings have been laid before them, and the action taken by me in the matter has met with the unanimous approval of the principal shareholders of the company. I would only add I was appointed and supported by some ninety shareholders, to most of whom the established reputation of this office is the guarantee that their interest would be protected by me. FRED. WARWICK.

Chief Offices, 25, Bucklersbury, London, and Swansea, April 23.

THE EMMA MINE.

SIR.—As a shareholder in this hapless undertaking, you will scarcely be surprised to hear that I am in one of the most ingenious and believing ever formed for the complete bewilderment of innocent and believing investors. Everyone outside our executive tell us we possess "a valuable mine, with reserves" actually in sight of the net value of 100,000*l.*—that the "mine never looked better than now"—that there is only "just sufficient ore being taken out to meet the current expenditure"—and that, by and by, when all subsidiary matters shall have been satisfactorily arranged—when, in other words, those voracious "bears" shall have satiated themselves by "tramping Wall-street term"—filling in their stock, there will be a grand flourish, and Emma announcing "great discoveries," shares advancing high in price, and Emma again becoming the "Queen of the Hill." On the other hand, our sympathetic manager, after having "interviewed" our Chairman and Mr. Park in New York, has arrived in this country, and the official letter notifying his arrival gave us a pretty clear inkling of the gist of the report to accompany the circular convening the forthcoming general meeting. Who, then, are we to believe?

It would seem *prima facie* that our manager can have no possible object in mis-

April 21.

[illegible]

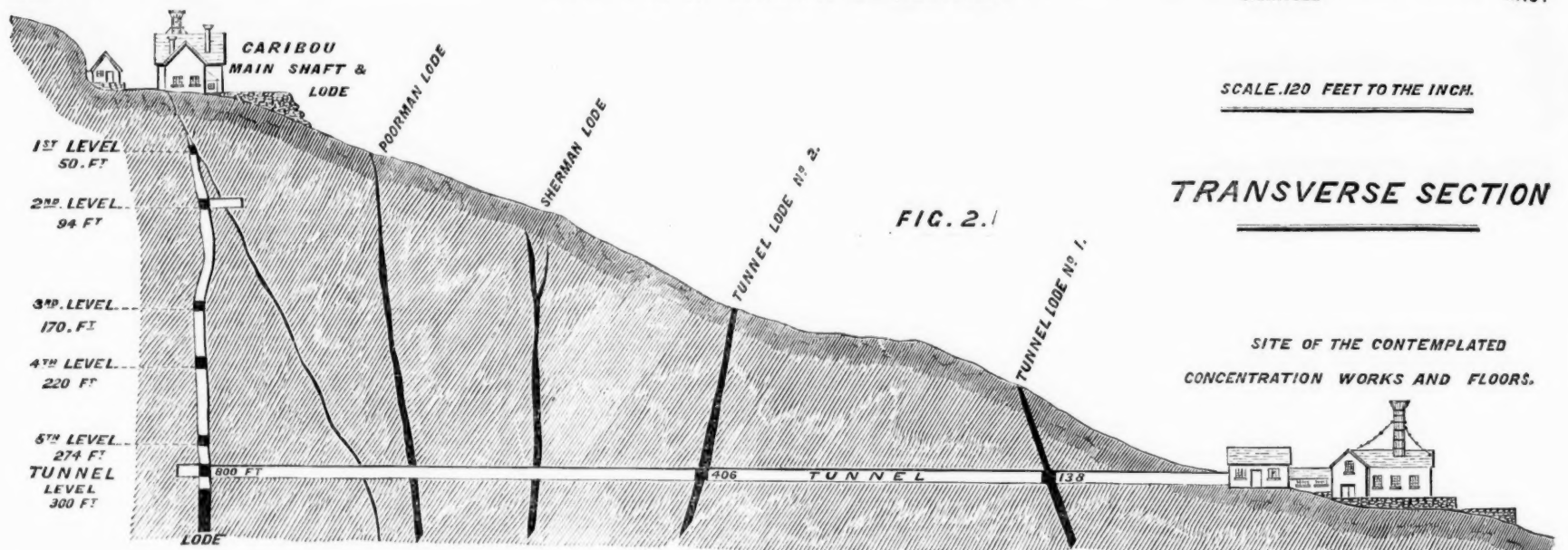
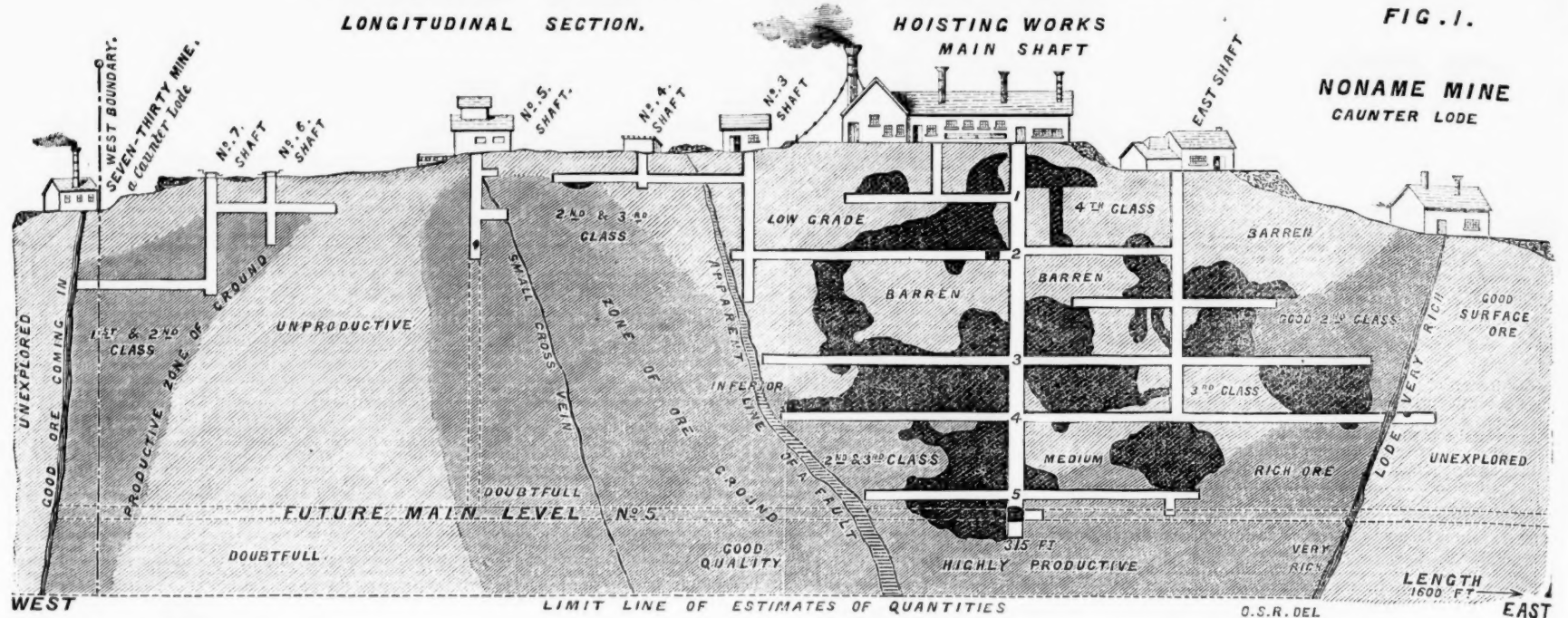
Eastbourne, April 23. SHOVEL.

[For remainder of Original Correspondence, see to-day's Journal.]

Mr. Isaac Jenks, ironmaster, Wolverhampton, one of the recently elected directors of the Nant-y-Glo and Blaena Ironworks Company (Limited), has notified his withdrawal from that undertaking.

COLORADO SILVER MINES—THE GREAT CARIBOU.

THE NEDERLAND MINING COMPANY, THE HAGUE, HOLLAND.



There has probably been no mining property in Colorado, of late years, that has figured so conspicuously, or become of greater public repute, than this celebrated silver mine. It is situated in Boulder county, in section No. 8, township 1, south, in range 72 west of principal meridian, between the North and Middle Boulder Creeks, and about midway from the foot-hills of the Plains and the Snowy Range, at an elevation of about 9700 feet above sea level. Its discovery, in 1870, caused quite an excitement, and a rush to the place soon set in, resulting not only in the discovery and opening of several other mines, but the building up of quite a little mountain town. An excellent turnpike road of easy grade has been constructed from the mines, five miles in length, to the extensive mills and reduction works of the company; these are on the Middle Boulder, a powerful mountain stream, fed by the melting snows of the range in summer and numerous springs in the winter; the average volume of water I estimate at 470 cubic feet per minute. Around these works another village has been built, and which, I am informed, is hereafter to go by the name of Nederland. The improvements of the Caribou district have been rapid; they are well laid out, most of the houses are neat, while some are really pretty, and all designed for utility. There is a project now on foot to construct a line of railway from here to connect with the Colorado Central, at Central City; the distance is only about 16 miles, it can be made at an average gradient of 75 feet, and at a cost of \$12,000 per mile; when completed freight will be reduced 75 per cent.—from \$12 down to \$3 per ton.

Geological.—If it was not for the azoic nature of the formation in which the mine is situated I should place it in either the lower Silurian or post Cambrian; the rocks are very old, all greatly indurated and metamorphic, many are highly crystalline and inclined to represent an igneous character. In their order of superposition, and lithological features, they differ but slightly from the European systems, if they are not positively their equivalents; there are, however, no primitive granites, although large masses and eruptive coarse quartzose granite veins are common; generally speaking, the formation may be classed as schistose; there are heavy beds of an inferior syenite, strong porphyry dykes and injected veins of basalt, trachyte, and other rocks of the trap family. Some of the blue gneiss strata are very beautiful both in texture and colour; this rock is the favourite associate of the rich silver deposits of Colorado, at Caribou. Silica represents 80 per cent. of the entire rock formation, felspar about 12; horn-blende, alumina, alkaline earths, and the oxides of the metallic minerals the remainder. Constructively viewed quartzite is the most prominent rock, interstratified with a ferruginous gneiss; as these are more or less mineralised, so the lodes passing through them contain a greater or less amount of metallic mineral. Porphyry, either in contact or close proximity with the lodes, invariably cause deposits of the precious metals. The granites here are concretionary or secondary, and are generally gold-bearing, but when they merge into the mica or hornblende schists, produce silver-lead. Such is a brief geological outline of the Caribou district.

The CARIBOU LODE varies but little from an east and west magnetic course, dipping slightly to the north. It was discovered by the outcropping of a small independent vein, carrying rich specimens of silver ore; this, on being followed down for 48 ft., the present great lode was intersected. It is embedded in a stratum of dark blue-gray syenite, of several hundred feet in thickness, as proved by the cross-cut tunnel (see Fig. 2); this rock is highly mineralised, it contains 84 per cent. of magnetite—i.e., black oxide of iron—a little copper and zinc blende; its hornblende is fibrous and minutely comminuted; hardness about 6; specific gravity, 2.815; water, 74 per cent.; cleavage planes run from 10° N. to 14° W.; bed joints dip S.E.; the rock is compact and steady in position. The Caribou is, therefore, a true fissure lode; it is from 2½ to 8 ft. in width, its leading

ore vein may be taken at an average of 3 ft. thick; it has been very productive, and exceedingly rich in places; some ore sent to England sold for \$1950 per ton; average of 1st class is about \$300, 2nd class \$120, and 3rd class \$40, consequently very profitable. There are enormous quantities of 3rd and 4th class ores, both at surface and in the reserves underground, waiting the erection of concentration works, the returns alone from which should meet the entire cost of the establishment, leaving the 1st and 2nd class ore nearly all profit. There are seven shafts, the main one is 315 feet deep; to meet the 5th level a cross-tunnel is being driven up, and is now within 200 feet of the lode (see section, Fig. 2); when this communication is made no further hoisting to the top of the hill will be needed, and a great saving effected by working the entire mine through the tunnel, at the mouth of which will be the sampling and concentration works. By reference to the section, Fig. 1, it will be seen there has been 2000 fms. of ground removed in shafts, levels, and stopes; from this has been returned, up to December, 1873, \$619,757 worth of ore, being equivalent to \$309.87 per fathom of ground; now, when it is known that the average value of the ground in sinking, driving, and stoping does not exceed \$85 per fathom, the inference to be drawn is that it must be very remunerative mining. The total amount of sales I have received from the office, but I have not been able to ascertain the actual number of tons of ore that have been reduced, therefore, cannot state the value per ton; but, from a large number of samples I took in different parts of the mine, the specific gravity, by averaging, runs thus:—

$$\frac{2.92 + 2.65 + 2.76 + 2.58 + 2.66}{5} = 2.77 \times 62.5 = 173 \text{ lbs. per cubic foot.}$$

Now, if the ore part of the lode throughout the workings is taken at 3 ft. thick, the 2000 fms. excavated must have given 1968 tons of vein stuff, which having proved worth \$619,757, the crude ore would be \$31.47 per ton, this approximates very nearly to the valuation of the ground when taken by the superficial fathom. Now, it has been supposed by many persons the lode has decreased in value in depth; this is an erroneous opinion, which can be shown by the estimates computed from my recent survey, which was done with great care, and for the express purpose of letting the proprietors know the real and true value of their property. To render this valuation lucid, I have marked off a piece of ground 10 fms. below tunnel level, as a limit to define a given quantity, and assumed certain portions of the ground standing above as barren or unproductive; this contains 3638 fathoms of ore-producing ground, or 26,041 tons of milling vein stuff, the average value being \$296.48 per fathom, or \$41.96 per ton, and allowing 20 per cent. for loss in reduction, amounts to net \$1,088,634 gross value. These valuations are deduced from analytical calculations from about 20 cross sections, carefully taken, in various parts of the mine, in the manner of which Figs. 3, 4, 5, and 6 are examples. I wish to be explicit in the matter, as there are several very extensive mines in this country about to undergo, under my direction, a similar ordeal this year. I will commence with the country, or stratum, in which the lode is embedded—a syenitic granite.

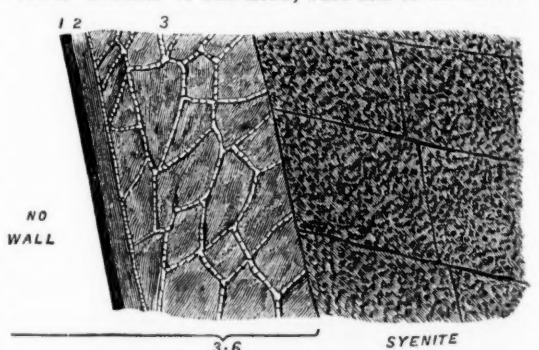
Analysis.	Per cent.
Quartz (silica)	74.50
Felspar	12.00
Hornblende (granular and fibrous)	2.00
Alumina (argillaceous clay)	2.50
Iron, chiefly black oxide (magnetic)	8.00 = 100

Gangue of the lode.	Per ct. sp. gr.
Quartz	0.70 x 2.35 = 1.6450
Felspar	0.20 x 2.25 = 0.4500
Earthy ferruginous clay	0.10 x 2.45 = 0.2450
	2.34 average specific gravity.

The Ores.—The silver ores proper are a cupreous argentiferous pyrite, but the amount of sulphur is not heavy, it contains some zinc-blende and antimony, and more of the latter the larger the amount of silver; the ore is remarkably light, the average specific

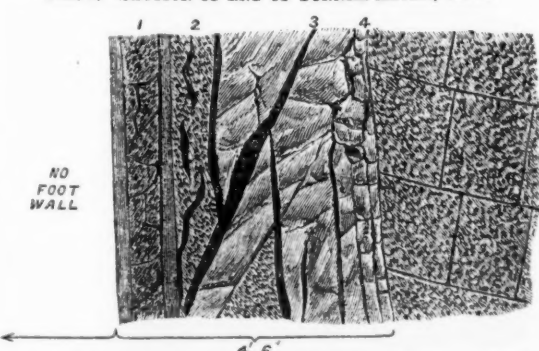
gravity being 3.80. The silver-lead is also very light, the average of eight specimens only gave specific gravity 5.50. Galena itself, such as we obtain from Missouri, runs up to 7.50; the quartz, also, is very light. Whether it is porous or less anhydrous, through induration, or the rarity of the atmosphere at these altitudes, I do not know, but the most dense sample I have yet tried has not a specific gravity of over 2.40, while it should be 2.60; the granular quartz does not exceed 2.25 in any part of this mine; this is a subject for the contemplation of our analysts. The flookans are the heaviest, where compact they run up to 2.50. The average of the vein stuff has a specific gravity of 2.77, consequently it contains 15.52 per cent. of metallic mineral of some kind, what this mineral is can be ascertained by passing it through the crucible and muffle.

FIG. 3.—SECTION OF THE LODE, WEST END OF 5TH LEVEL.



No. 1.—3 inches of silver-bearing ore, nearly solid.
No. 2.—3 inches of gossan, carrying silver, ore of 2nd class quality.
No. 3.—Main body of the lode, chiefly quartzite, but with reticulated strings of white quartz; some of the interstices are filled in with felspar and argillaceous clays full of mineral; this end may be valued at 2½ tons per fathom of \$95 ore. Cost of driving and stoping \$62 per fathom.

FIG. 4.—SECTION OF END OF TUNNEL LEVEL, WEST.



No. 1.—10 inches of blue quartz matrix, with gossans on each side, full of fine-grained bright prills of silver-lead, and cubical black

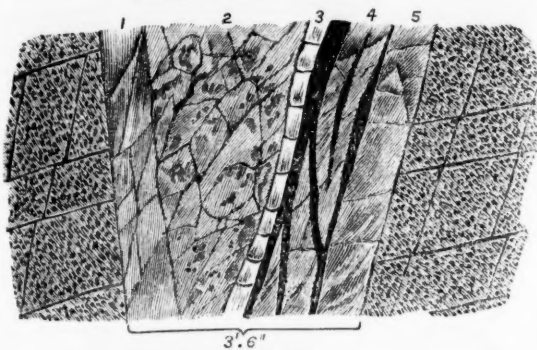
oxide of iron, with some sulphuret of same, worth 1 ton of 200 oz. ore per fathom.

No. 2.—Soft granite, felspar in excess, white mica in comminuted scales; small strings of blue sulphuret of silver pass up through it; the ore is rich, main body quartzite.

No. 3.—Cross feeder of rich silver-lead, $\frac{1}{2}$ in. at top, $1\frac{1}{2}$ in. in middle, and 1 in. at bottom, in an opaque quartz matrix, average 1 in. of ore; will run from 300 to 500 ozs. in silver.

No. 4.—A mixture of quartz and felspar; in it are strings of silver-lead; wall irregular; lode close and inclined to hardness, carries 2 $\frac{1}{2}$ tons of ore, average yield 180 ozs., value \$360 per fathom; cost of driving and stopping \$85 per fathom.

FIG. 5.—EAST SIDE OF SHAFT.



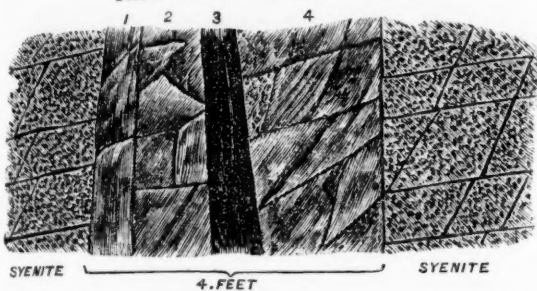
No. 1.—Brown quartzite, non-metallic.

No. 2.—Mottled segregated quartz, much coloured with carbonate of copper, with films of blue and black decomposed sulphuret of silver.

No. 3.—Vein quartz and felspar, very hard.

Nos. 4 and 5.—8 inches of mixed silver-lead ore and copper in a friable quartz gangue; specific gravity 5.25; the ore is a little scattered, it may be taken at 5 inches solid, produces 2.469 tons per fathom of 200 oz. ore, which, at 80 cents, gives \$395 per fathom; cost of driving and stopping \$85.

FIG. 6.—WINZE IN EAST, 5TH LEVEL.



No. 1.—A decomposed brown ferruginous quartz, 6 in. thick.

No. 2.—Soft green-gray granular felspar and quartz, carries silver.

No. 3.—A vein of silver-lead ore, 4 in. at top and 12 in. at bottom; it is porous; this is on the east side of the winze; on the west this vein is 5 in. solid; the samples I selected gave an average specific gravity of 3.974, and assayed at 201 ozs. of silver, with some copper, and 20 per cent. in lead; the average of this course of ore exceeds 8 in., therefore gives 2.979 tons per fathom, which, on the 80 cents per ounce basis (exclusive of the lead), is worth \$479 per fathom.

No. 4 is a quartzite gangue, containing some 4th class vein stuff, but not to value. When the tunnel is driven up all this ground can be worked away at \$60 per fathom.

Now, from the foregoing measurements and valuations of this piece of ground, which contains 530 fathoms, the averages are \$348 per fathom, aggregating \$184,440 in gross value, showing most conclusively the lode increases, rather than diminishes, in value with greater depth.

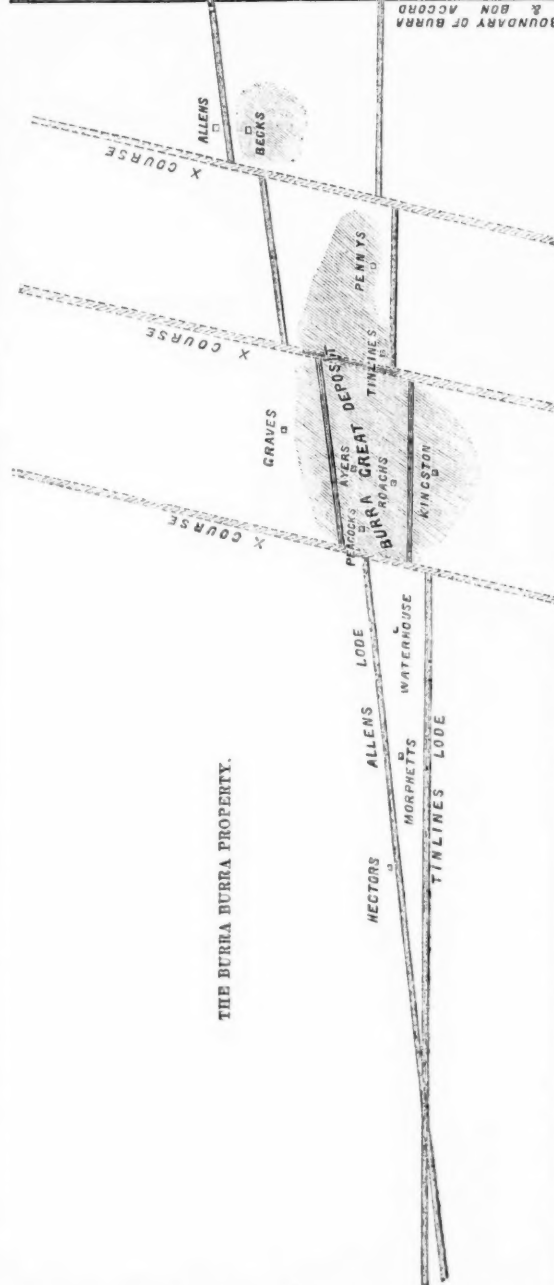
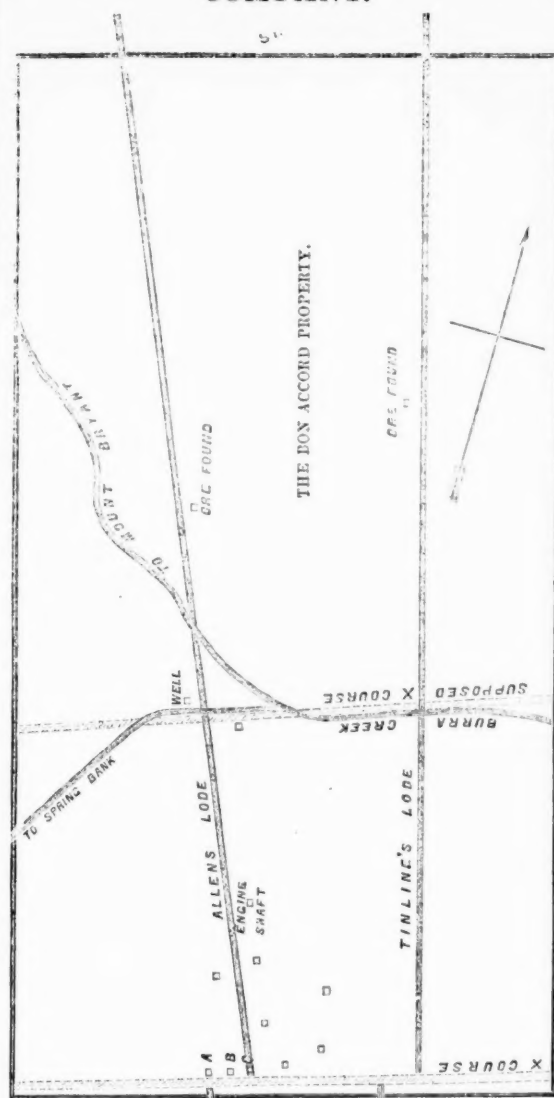
The Corporation and Future of the Mine is organised under the laws of the Territory, with a capital of \$3,000,000 fully paid. Moses Anker, Esq., of Boulder, and M. C. Shaffenburg, of Denver, are local directors. P. H. Van Diest, manager, and Capt. Wm. M. Rule, of Cornwall, the mine agent. The property originally belonged to Messrs. Breed and Cutter, of Cincinnati, Ohio, and was purchased by and sold to the present "Nederland" company by Mr. Anker; before purchasing, it was examined and valued by Prof. Vogelsay, of the School of Mines in Holland, and Mr. Van Diest, of the same place. Their report states the reserves amounted to 34,000 tons; the depth taken is not stated, but the value is placed at \$5,700,000, or \$167.64 per ton. This is far too high for average; but if the present courses of ore should hold down for another 100 fms., more than 10,000,000 will be returned. The admissible limits of a Journal article prevents detail; I am, therefore, compelled to curtail description; but if ever my recent report should be published, of which this paper is a mere extract, the whole will be easily understood, that some grave errors, both in the mine and in the milling has been made is evident to all practical mining engineers; this is perfectly excusable, the early operators did the best they knew how with the financial means at their command, which was limited; if they made a slip, which I consider they did in locating their reduction works five miles away from the mine, instead of erecting them in the park or meadows at the mouth of the present mine tunnel, it must be looked on as a matter of inadvertence. As a practical miner myself, I cannot approve of the plan of underground operations hitherto pursued. I have been called upon to express my opinion hereon; this, for prudential reasons I have, as yet, respectfully declined to do. My drawings show the mine as it is. But as the management had the acumen to engage a Cornish mining agent (Capt. Wm. M. Rule), a son of our old esteemed friend Capt. Rule, of Cornwall, to take charge of the works, I hope no underground errors will ever again be made.

The Caribou is a great mine, second to none in the Western States or Territories. I do not call it a rich mine, but it is a very productive one, and when judiciously managed, and all its products utilised, will pay handsome dividends for a great many years to come. Could space be afforded, I should like to describe some points which in the future must become prominent. At either end of the set or grant are caunter lodes, against which, or at the junction, the lode makes "very rich." The one at the east is called the "No Name;" its course is N. 46 E., being a difference of 20°, with the Caribou; it carries native silver and silver glance, worth thousands of dollars per ton; at the west end is another, known as the "Seven-thirty;" this, too, is rich, but at present not equal to the other. Now, at the intersection, the "Caribou" lode partakes of the nature of each. I have seen lumps of solid native silver from the "No Name" several ounces in weight, and the gangue spangled throughout with the same metal. What these caunters will produce, or how effect the lode in depth, is a matter for scientific speculation, a discussion on which is not admissible in this article. I will, therefore, conclude by expressing a hope that the proprietors will continue to open out the mine by sinking and driving in a miner-like manner, what they are now doing; erect dressing and concentrating works close to the tunnel, and thus utilise all their third and fourth class ore. With economical management the stockholders may congratulate themselves they have made a profitable investment.

Central City, Colorado.

CHARLES S. RICHARDSON,
Mining Engineer, &c.

THE YORKE PENINSULA MINING COMPANY.



Report on the Bon Accord property by Capt. Robert Sanders (with permission of the directors) of the Burra Burra Mine in South Australia:—

I have inspected the Bon Accord Mine, and herewith beg to submit my report. I presume I need not make an elaborate report by entering into the various details of surface appearance, and work done below, &c. Suffice it to state that the property is to the north of and adjoining the celebrated Burra Burra Mine.

By reference to the accompanying surface plan (which will illus-

trate my report) it will be perceived that the Burra contains two separate and distinct lodes, bearing about 30° and 20° west of north and east of south respectively; thus diverging going into the Bon Accord property. In the Burra these lodes are traversed by several cross-courses, causing intersections and dislocations, which are always desirable in a mining property, and are considered the "factors" of mineral veins. It is between these cross-courses or natural dams that the great deposits of ore were found in the Burra.

By a reference to former reports, and from information collected, I find that thirteen shafts (besides engine-shaft), varying from 7 fms. to 24 fms. deep, have been sunk on your property; nearly the whole of these have been sunk there in the ground between the two lodes. The engine-shaft has been sunk to a depth of 50 fms., and levels driven as follows:—At the 20 fm. level a cross-cut west 12 fms.; cut Allen's lode 12 ft. wide, and drove north and south on its course 64 fms. At the 40 a cross-cut west 10 fms.; cut Allen's lode 14 ft. wide (spots of ore); drove south 12 fms. At 50 cross-cut west 9 fms.; cut Allen's lode 14 ft. wide, drove north 9 fms., fine stones of ore. At the 20 cross-cut, 8 fms. east, cut large stream of water; took two 17-in. lifts going eight strokes per minute to fork it down. Instead of following the water coming in through this fissure (I believe the best indication of a lode ahead), a dam was put in the cross-cut to keep back the water, and there it stands to this day. Although the shaft was sunk to the 50, no cross-cut was driven east again fearing to cut the feed of water. If the divergence of the lodes continues, as seen at Burra, they would be 100 fms. apart at your engine-shaft. Allen's lode, 12 fms. to the west, and Tinline's lode, 88 fms. to the east of your engine-shaft. Tinline's lode (which we consider the main lode in the Burra) has not yet been seen in your property.

Looking at the configuration of the surface, the fact of the Burra engines keeping the water there to the 50 fathom level, yet in no way affecting the rise and fall of the water in your property, I consider a plain proof of the existence of intervening cross-courses. I am of opinion that a very strong course-course exists close to your south boundary, causing a lateral shift of the lode to the east of about 20 fathoms. This will account for not finding Allen's lode in your shaft A, in a line with the same lode in the Burra, and within 3 fathoms of the Burra boundary. Neither was it seen in your shaft B; but plainly seen (with good stones of ore in it) at your shaft C. This must be so, or a cross-cut 12 fathoms west from engine-shaft could not have cut it. I believe there also exists a very strong cross-course in the Burra creek, as when you were keeping the water at the 50 fathom level at your engine-shaft, the water stood in the shaft to the north of the creek in your property within 18 fathoms of the surface. I believe, also, that between these two cross-courses there has been a great deepening, or down throw, so that deposits of ore will not be found near the surface; but that to the north of the creek deposits of ore will be found at shallower depth.

Taking a view of your property in all its features and bearings in connection with the Burra lodes, and the fact of the existence of cross-courses traversing the same, I do not hesitate to affirm, as my firm belief, that you have all the features and elements of a profitable and lasting mine. I can, therefore, conscientiously recommend it as above ordinary speculations.

Should you be about to resume operations, I would suggest that 12 men be employed in costeering, six to the north of the creek to find the outcrop of the lodes, and six to the south of the creek to try to trace Tinline's lode from the Burra, in order to prove the relative position of lodes in your property to the lodes in the Burra. These facts ascertained, you could then see if the present engine-shaft be in a proper position, if not, a proper site could be selected for a new and permanent engine-shaft. This staff of men with supervision for 12 months would cost about 16000, to 17000. I believe this amount judiciously expended would show results and features that would justify you in extending operations.

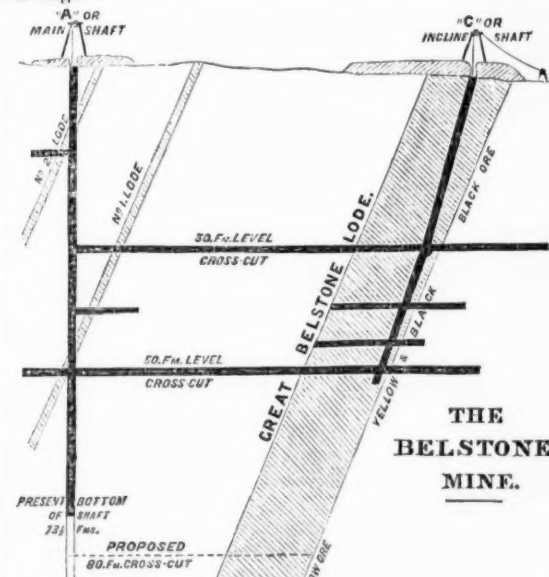
ROBERT SANDERS.

Burra Burra Mines, Dec. 23, 1873.

COPPER MINING IN MID-DEVON.

It has long been supposed that in the neighbourhood of Okehampton and Sticklepath large quantities of mineral existed, and from time to time several trials have been made in different parts of the district, and these, although of a weak and inefficient character, resulted in conclusive evidence being obtained, from the large stones and spots of ore and other indications, that undoubtedly there were large deposits of minerals at deeper levels.

At the Fursdon Mine, at South Zeal, more extensive operations have been carried out, and considerable quantities of copper ore have been raised and sold. It seems probable, however, that a new era is now dawning upon the district, owing to the steady perseverance with which the proprietors of the Belstone Mine are pushing forward their sinking operations. This property, which is very extensive, consists of two mines—the Taw River and the Copper Hill, or Belstone, Mine—the limits of the setts extending from 2 to 3 miles in length on the course of the lodes, and from $1\frac{1}{2}$ to 2 miles in width. At Copper Hill three shafts have been sunk, and several highly promising lodes have been cut into; one, the main lode, proved to be of extraordinary size, over 100 ft. in width, and upon this lode an incline shaft is sunk to the depth of 54 fms., from which explorations have been made at the 30, 40, and 47 fm. levels, the result of which is to prove that this great lode contains copper ore of a very rich quality, averaging from 11 to 14 per cent. more or less throughout its width. We believe something like 60000 has been realised by the sales of ore. At the 30 and 40 fm. levels the ore is mostly found in black bunches, but as depth is reached good branches of yellow copper ore are met with, and it is confidently believed that immense deposits of yellow copper ore will be found at deeper levels. It has been from the first predicted that at a depth of about 80 fms. these deposits will be met with, and from the following illustration, for which we are indebted to the courtesy of the directors of the Belstone Mining Company (Limited), it will be seen that the main shaft, which is being rapidly sunk, is down to the depth of 73 $\frac{1}{2}$ fms., so that a few months more will see the 80 fm. level cross-cut driven, and the lode intersected at a point nearly 200 ft. below the present workings:—



The proprietors are backed in their confident anticipations by the opinions of first-rate mining engineers who have examined the pro-

PEAT.—Mr. R. STONE, of Liverpool, has patented some improvements in preparing of peat for the manufacture of fuel by an improved system of drying and preparing peat on peat lands, and in machinery and apparatus employed therefor; also in machinery and apparatus employed for crushing and triturating or masticating the fibrous portions of the peat and evaporating the moisture contained in the peat pulp, thus drying the peat and preparing peat dust or powder to be used as a fuel by being mixed with inflammable liquids or substances pressed into blocks, as is well understood.

HOLLOWAY'S OINTMENT AND PILLS—RHEUMATISM AND NEURALGIA.—It is sometimes difficult to determine which of the diseases is afflicting the sufferer, but such uncertainty is immaterial if Holloway's remedies be used. The cure of all muscular and nervous pains. In hereditary rheumatism, after bathing the affected parts with warm salt water, Holloway's ointment should be well rubbed upon the spot, so that it may penetrate and exert its soothing and regulating properties upon the deeper vessels and nerves, which bring about the relieving cause both pain and swelling. Holloway's pills will also be highly efficacious in the cure of such rheumatism, and the substitution, which was the inevitable result of the bleeding, mercury, and colicium practice formerly adopted in these complaints.

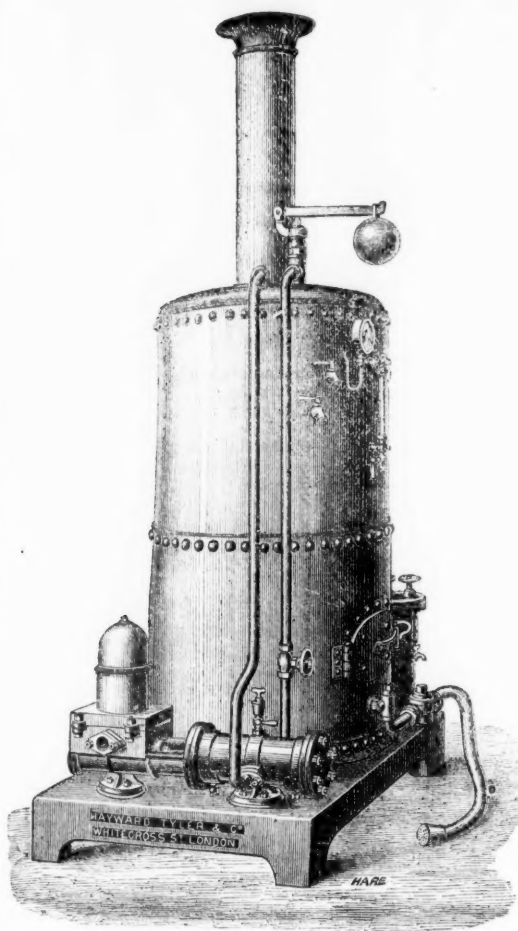


HAYWARD TYLER & CO., ENGINEERS,



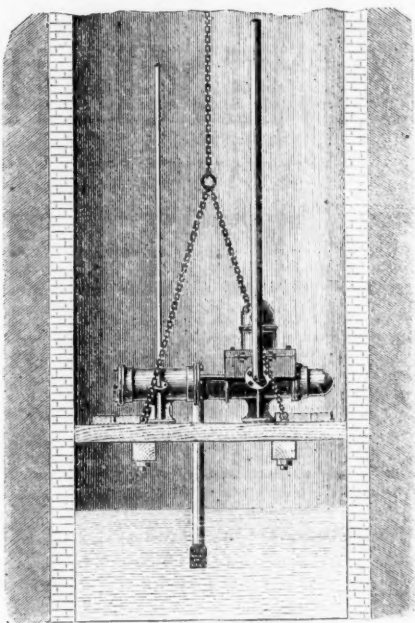
WERE AWARDED FOR THESE PUMPS FOR DEEP MINING AND OTHER PURPOSES,

THE GRAND PRIZE MEDAL FOR PROGRESS.



THE "UNIVERSAL," WITH BOILER.

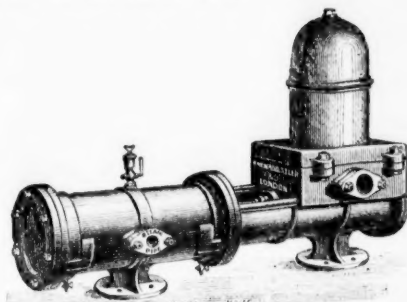
"Important to buyers of this Steam Pump is a specimen of one of the steam valves, shown after working for more than two years. It is without any wear, without even a scratch, and the marks of the tool can be seen."—*Engineer*, Dec. 13, 1872.



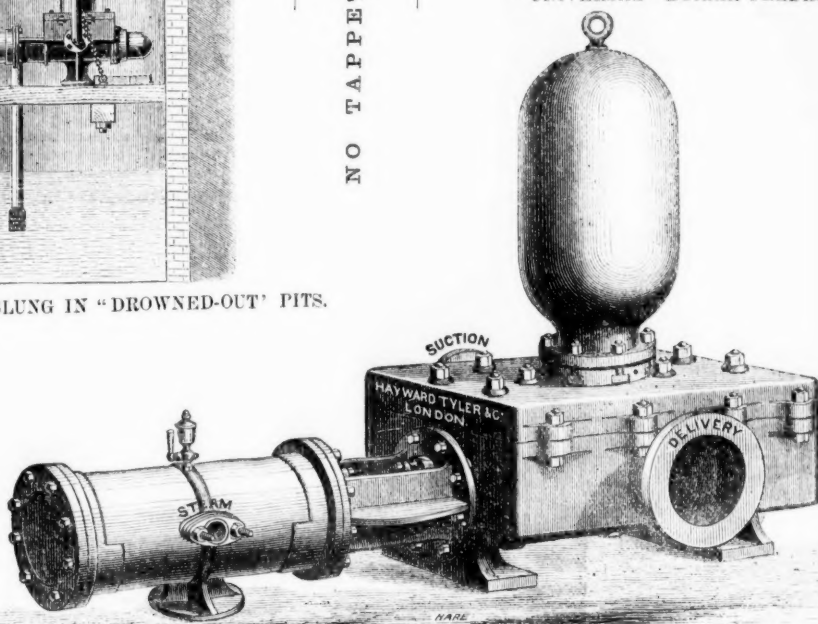
SHOWING THE "UNIVERSAL" SLUNG IN "DROWNED-OUT" PITS.

"It is a fact that, although there are a variety of Direct-acting Steam Pumps in the Exhibition, none that we have noticed works so quietly."—*Engineer*, Aug. 1, 1873.

NO TAPPET VALVES.



"UNIVERSAL" BOILER FEEDER.



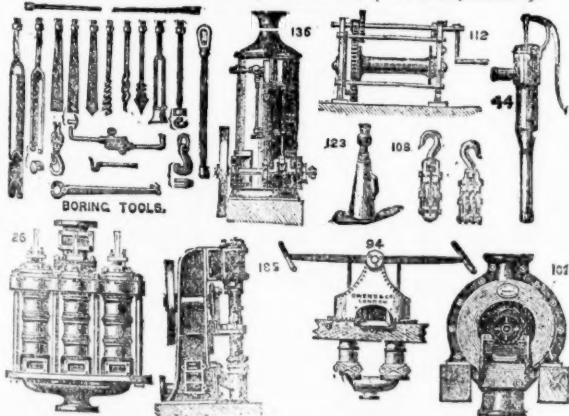
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THOMAS WARDEN & SON, IRON, STEEL, AND GENERAL MERCHANTS, LIONEL STREET, BIRMINGHAM,

Manufacturers of Anvils, Vices, Hammers, Bellows, Tug Irons, Hydraulic and Screw Jacks, Crabs, Cranes, Spades, Shovels, Picks, Arms and Boxes, Axles, Springs, Hurdles and Fencing, Screw Bolts, Washers, Hames, Chains, Files, Nails, &c., &c.
SECOND-HAND RAILS, AND EVERY DESCRIPTION OF RAILWAY, COLLIERY, AND CONTRACTORS PLANT ALWAYS ON HAND.

S. OWENS AND CO., Hydraulic and General Engineers, WHITEFRIARS STREET, FLEET STREET, LONDON

AND AT
195, BUCHANAN STREET, GLASGOW (W. HUME, AGENT).



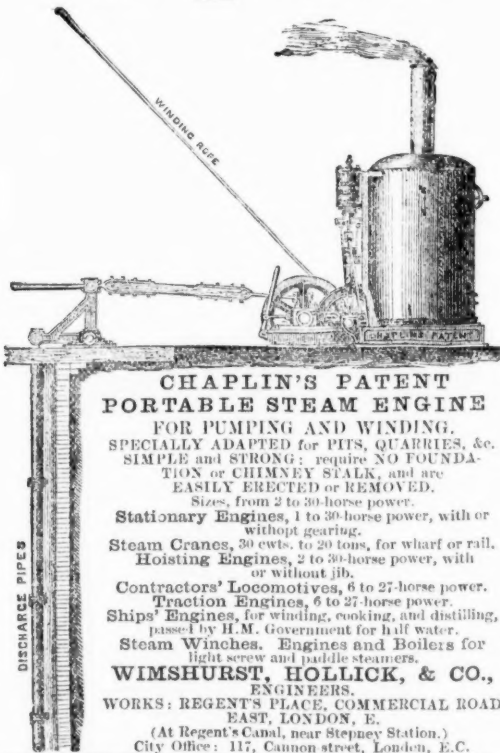
MANUFACTURERS OF
BORING TOOLS, for testing ground for Minerals, Bridge foundations, Artesian Wells, &c., to any depth.
No. 26.—Treble Barrel and other Deep Well Pumps.
No. 136.—Vertical and other Portable Steam Engines.
No. 185.—Horizontal and Vertical Steam Pumping Engines.
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No. 108.—Pulley Blocks of all sizes.
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No. 44.—Portable Wrought-iron Pumps, ditto ditto
No. 102.—Bernay's Patent Centrifugal Pumps, of all sizes.

ALSO EVERY OTHER DESCRIPTION OF
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COMPRISING
TURBINES, WATER WHEELS, WIND ENGINES,
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Prize Medal—International Exhibition, 1862.



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PORTABLE STEAM ENGINE
FOR PUMPING AND WINDING.
SPECIALLY ADAPTED FOR PITS, QUARRIES, &c.
SIMPLE and STRONG: require NO FOUNDATION or CHIMNEY STALK, and are EASILY ERECTED or REMOVED.
Size, from 2 to 30-horse power.

Stationary Engines, 1 to 30-horse power, with or without gearing.
Steam Cranes, 30 cwt. to 20 tons, for wharf or rail.
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Ships' Engines, for winding, cooking, and distilling, passed by H.M. Government for half water.
Steam Winches, Engines and Boilers for light screw and paddle steamers.
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CELEBRATED TRANSIT CIRCUMFERENTOR,
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A simple portable instrument. Requires no timing.

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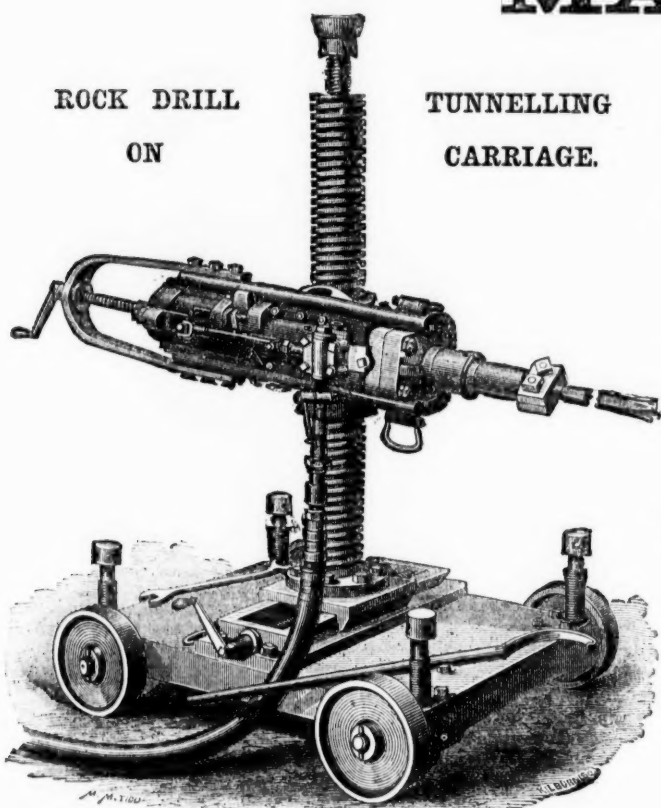


TWO GRAND MEDALS for PROGRESS AT THE VIENNA EXHIBITION



AWARDED TO

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ROCK DRILL
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Two Silver Medals, Highland and
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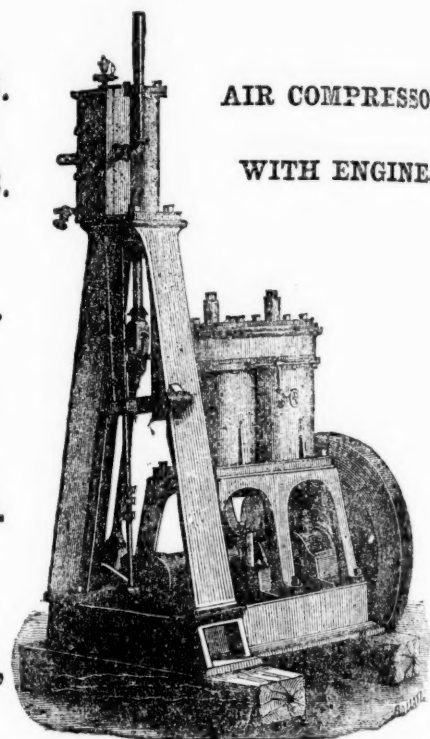
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Tunnelling, Shaft-Sinking, &c.NEW ILLUSTRATED CATALOGUES, PRICE LISTS, and
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WITH ENGINEAdapted for Driving Rock Drills, Coal-
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to be conveyed long distances.The Drills (in 5 Sizes) can be Mounted on any Description of
Carriage or Support, according to the Nature of the Work.

"BURLEIGH" MACHINE VERSUS HAND DRILLING.

Extract from Paper read before the British Association at Bradford, 1873, on Brain's System of Mining and Shafting Sinking at the Drybrook
Iron Mines, Forest of Dean, using the "Burleigh" Rock Drilling and Air Compressing Machinery:

(Shaft 10 ft. Diameter.)

COST OF SHAFT BY HAND

During a Fortnight.

Sinkers, twelve, 12 days each, at 5s. 6d.	£39 12 0
Water Fillers, three, 12 days each, at 3s. 6d.	6 6 0
Blasting powder	1 2 0
Total	£47 0 0

Depth Sunk 3 yards—Cost per yard . . . £15 13s. 4d.

COST OF SHAFT BY MACHINE

During a Fortnight.

Sinkers, three, 12 days each, at 5s. 9d.	£10 7 0
Labourers, six, 12 days each, at 3s. 6d.	12 12 0
Engine Stokers, two, 12 days each, at 2s. 6d.	3 0 0
Dynamite, 60 lbs., at 2s.	6 0 0
Electric Fuses (Brain's) 20 per day, at say 6d. each	6 0 0
Coal for Air Compressing Engine, 12 tons small, at 10s.	6 0 0
Oil for engines	0 5 0
Total	£44 4 0

Depth Sunk 5 yards—Cost per yard . . . £8 16s. 9d.

THE ABOVE STATEMENT REPRESENTS WHAT IS NOW BEING DONE AT THE ABOVE MINE.

ADDITIONAL TESTIMONY.

(COPY.)

Messrs. T. BROWN & Co., 96, Newgate Street, London, E.C.

DEAR SIR,—I have much pleasure in informing you that the Rock Drill and High-pressure Boiler, with which you supplied us, are both working
extremely well.

I am, yours truly,

The Weardale Iron and Coal Company, via Darlington, Sept. 6th, 1873.

(For the Weardale Iron and Coal Company, Limited),

J. R. CRONE.

(COPY.)

DEAR SIR,—In reply to yours of 2nd inst., I am sorry I have not time to go into the comparative results of hand labour in sinking with that of the work done
by your "Burleigh Drill." All I can say is, that for the last few months it has been giving me every satisfaction, and there is a marked difference in the progress of our
sinking operations.

I am, yours truly,

JOHN MAIN.

Crossfield Iron Ore Works, Crossfield Moor Row, via Carnforth, Sept. 8th, 1873.



THE HIGHEST PRIZE
AND ONLY MEDAL "FOR PROGRESS"
FOR DIRECT-ACTING

STEAM PUMPING ENGINES

FOR MINING AND GENERAL PURPOSES, WAS

AWARDED BY THE INTERNATIONAL JURY, AT VIENNA, 1873,

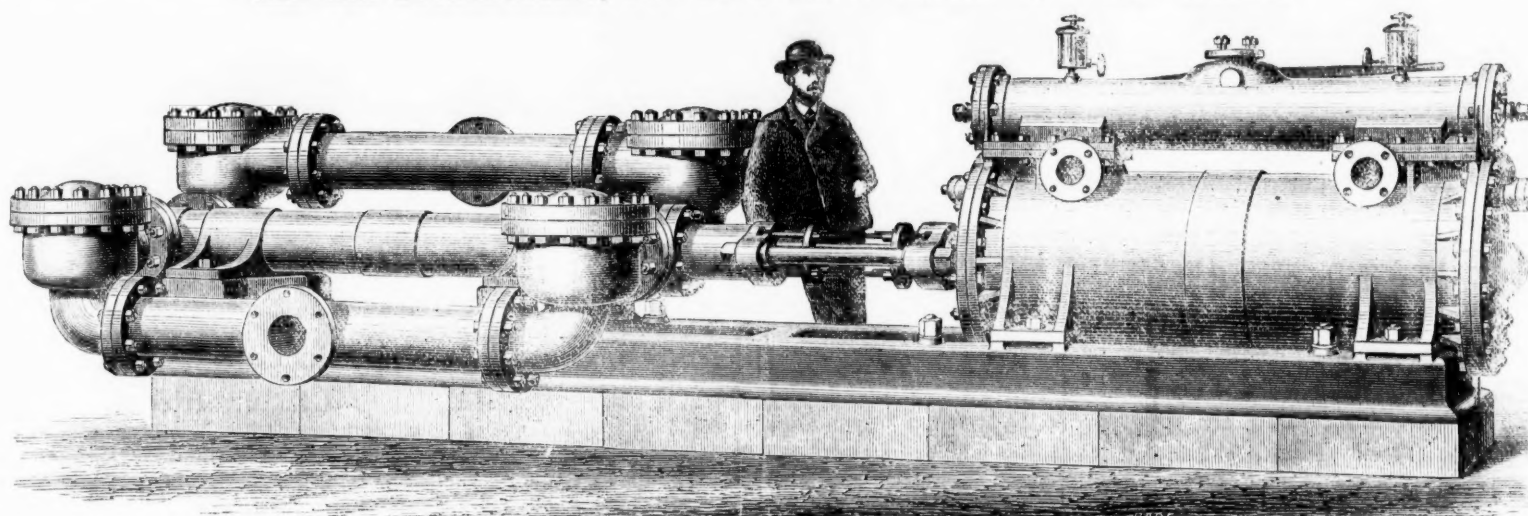
TO

TANGYE BROTHERS AND HOLMAN, LONDON,

FOR

"THE SPECIAL"
DIRECT-ACTING STEAM PUMPS.

OVER 3000 IN USE, AGGREGATING 25,000 HORSE-POWER. 200 SIZES AND COMBINATIONS OF THESE PUMPS ARE NOW MADE.
ALL ARE DOUBLE-ACTING, AND HAVE SHORT PISTONS AND LONG STROKES.



The "SPECIAL" Direct-acting Steam Pumping Engines require no costly Engine Houses or massive foundations, no repetition of Plunger Lifts, ponderous Connecting Rods, or complication of Pitwork, and allow a clear shaft for hauling purposes.

THE "SPECIAL" DIRECT-ACTING STEAM PUMPING ENGINE is the most simple, powerful, economical, and successful appliance for deep mine draining and general purposes of pumping ever practically developed, and the first cost is very moderate compared with the method of raising water from great depths by a series of 40 or 50 fathom lifts. They are all fitted with Holman's Patent Buffer Valves, which are reliable and durable under 1500 feet head. Any number of these Engines can be placed side by side, to work in conjunction or separately as desired, thereby multiplying the work of one Pump to any extent.

The "Special" Steam Pumping Engines are in use at the following among many other Collieries:—

The Special Steam Pumping Engines are in use at the following and many other colonies.											
	Pumps supplied.		Pumps supplied.		Pumps supplied.		Pumps supplied.		Pumps supplied.		Pumps supplied.
Acomb	1	Caprington	1	Gnoll	1	Newton Cap	1	Shilbottle	2	Wardley	1
Adelaide	4	Castle Eden	4	Haswell	4	Nerquis	1	Shildon	3	Washington	1
Ashington	1	Chell	1	Inkerman	2	North Bitchburn	1	Shotton	3	Waterhouses	1
Bell Brothers	6	Cornsay	4	Kilton Iron Company	2	North Brancepeth	1	Silverdale	1	Wearmouth	1
Black Fell	1	Darfield Main	3	Lambton	2	North Seaton	1	South Brenwell	5	Waterloo	1
Black Prince	1	Denend	1	Lintz	3	Old Flockton	2	St. John's	2	West Bitchburn	1
Bolekow, Vaughan, and Co.	11	Dinnington	2	Lancarach	2	Oakenshaw	1	Stratford	2	West Thornley	1
Brancepeth	1	Donisthorpe	1	Llynvi	1	Old Thornley	1	Stanrigg	1	West Yorkshire	1
Brandon	1	Drumgray	1	Lochore	4	Pease's West	1	Sutton Heath	1	West Lanes	1
Briggs, H., Son and Co.	1	Dunfermline	1	Longhurst	1	Pegswood	1	Thornley	3	Whitefield	1
Brinkburn	1	Duffryn	1	Lumley Thicks	1	Pelton	1	Tindale	2	Whitworth	6
Brownrigg	1	Eckington	1	Marley Hill	1	Pontyclere	2	Trimdon Grange	1	Widdrington	5
Bretby	2	Etherley	4	Milkwell Burn	2	Queensferry	2	Tudhoe	9	Worsbro' Dale	2
Butterknowle	3	Fell	3	New Brancepeth	3	Railey Fell	1	Tudhoe Grange	2	Worcester	4
Cambois	1	Findon Hill	3	New Copley	3	Seaton Delaval	2	Victoria	1	Workington	1
Cambusnethan	1	George	1	Newton	4	Shire Oaks	2	Vobster and Mells	2		

PARTICULARS OF THE "SPECIAL" STEAM PUMPING ENGINES SUITABLE FOR HIGH LIFTS IN MINES.

	6	7	8	10	12	7	8	10	12	14	16	8	10	12	14	16	18	21	10	12	14	16	
Diameter of Steam Cylinder	Inches																						
Diameter of Water Cylinder	Inches	3	3	3	3	3	4	4	4	4	4	5	5	5	5	5	5	5	6	6	6	6	
Length of Stroke	Inches	24	24	24	36	36	24	24	24	36	36	48	24	24	36	36	48	48	24	24	36	36	
Gallons per hour, approximate		2,200	2,200	2,200	2,200	2,200	3,900	3,900	3,900	3,900	3,900	6,100	6,100	6,100	6,100	6,100	6,100	8,800	8,800	8,800	8,800		
Height in feet to which water can be raised with 30 lbs. pressure per square inch of steam, or compressed air, at pump		180	244	319	500	720	137	180	281	405	551	720	115	180	259	352	461	581	793	124	180	247	320
Ditto ditto at 40 lbs.		240	325	425	665	960	183	240	375	540	735	960	153	240	345	470	615	775	1,058	166	240	330	426
Ditto ditto at 50 lbs.		300	406	531	831	1,200	228	300	468	675	918	1,200	191	300	431	587	768	968	1,322	207	300	412	532

PARTICULARS, &c.—Continued.

Diameter of Steam Cylinder	18	21	24	26	12	14	16	18	21	24	26	30	14	16	18	21	24	26	30	32	16	18
Diameter of Water Cylinder	6	6	6	6	7	7	7	7	7	7	7	7	8	8	8	8	8	8	8	8	9	9
Length of Stroke	36	48	48	72	24	24	36	36	48	48	48	72	24	24	36	48	48	48	48	72	24	36
Gallons per hour, approximate.....	8,800	8,800	8,800	8,800	11,900	11,900	11,900	11,900	11,900	11,900	11,900	15,600	15,600	15,600	15,600	15,600	15,600	15,600	15,600	19,800	19,800	
Height in feet to which water can be raised with 30 lbs. pressure per square inch of steam, or compressed air, at pump	405	555	720	855	135	180	234	300	405	525	620	825	137	180	225	310	405	475	630	720	142	180
Ditto ditto at 40 lbs.	540	740	960	1,140	180	240	312	400	540	700	827	1,100	183	240	300	413	540	633	840	960	190	240
Ditto ditto at 50 lbs.	675	925	1,200	1,425	225	300	390	500	675	875	1,033	1,375	228	300	375	516	675	791	1,050	1,200	237	300

PARTICULARS, &c.—Continued.

	21	24	26	30	32	18	21	24	26	30	32	18	21	24	26	30	32	21	24	26	30	32
Diameter of Steam Cylinder	21	24	26	30	32	18	21	24	26	30	32	18	21	24	26	30	32	21	24	26	30	32
Diameter of Water Cylinder	9	9	9	9	9	10	10	10	10	10	10	12	12	12	12	12	12	14	14	14	14	14
Length of Stroke	36	48	48	48	72	36	36	48	48	48	72	36	36	36	48	48	72	36	36	48	48	72
Gallons per hour, approximate	19,800	19,800	19,800	19,800	19,800	24,400	24,400	24,400	24,400	24,400	24,400	35,240	35,240	35,240	35,240	35,240	35,240	47,960	47,960	47,960	47,960	47,960
Height in feet to which water can be raised } with 30 lbs. pressure per square inch of steam, or compressed air, at pump	244	320	375	500	568	146	198	258	303	405	468	101	137	180	211	281	320	101	127	150	206	234
Ditto ditto at 40 lbs.	326	427	500	665	758	195	264	345	405	540	625	135	183	240	282	375	426	135	170	200	275	313
Ditto ditto at 50 lbs.	407	533	625	831	947	243	330	431	506	675	781	168	228	300	352	468	532	168	212	250	343	391

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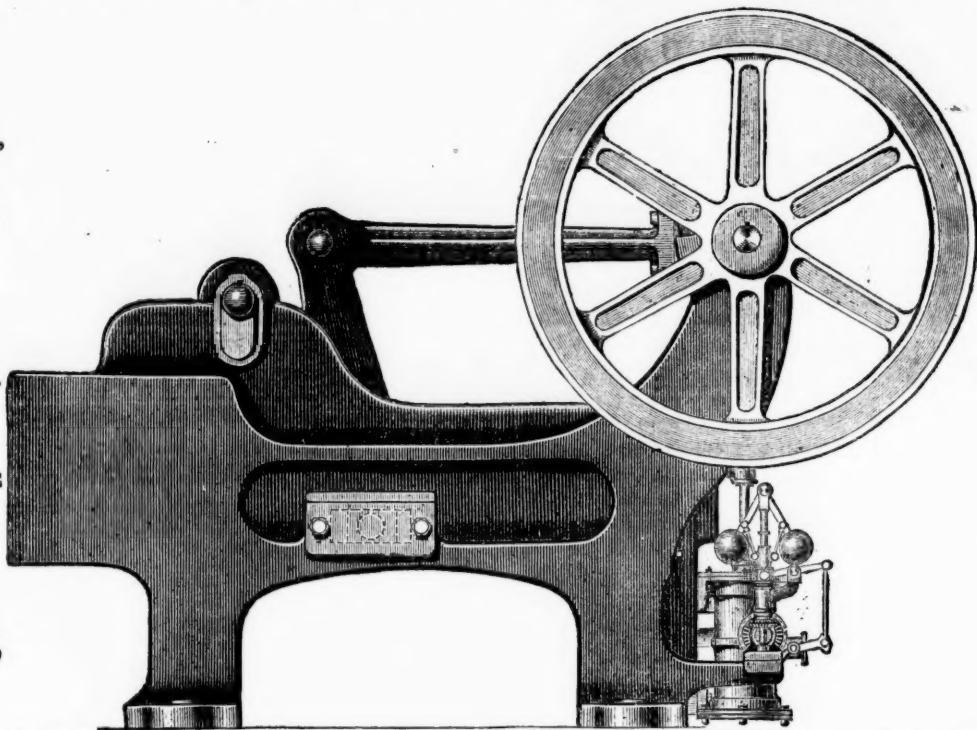
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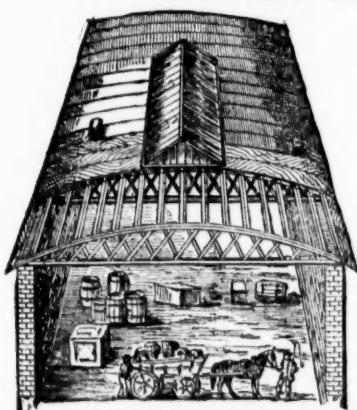
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